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JANUARY 1985

85p

Personal Computing Today

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Personal Computing Today

VOLUME 3 NUMBER 6
JANUARY 1985

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ABC

In April 1984 journalists were invited to a computer launch by a major hi-fi manufacturer. Although unusual in content, graced by the presence of Monet, Shakespeare, Einstein and the likes, the occasion stirred only moderate interest in the micro world.

Since then this micro has caused people to sit up and take notice. It is, of course, the Amstrad CPC464 and perhaps its biggest plus is the reliable and remarkable marketing policy pursued by Amstrad. The launch was held in April and the CPC464 was on sale to the public only two months later — complete, working models fitting the specifications announced at the launch. This in itself was very unusual and commendable in a year which saw the fiasco of the Sinclair QL. Amstrad didn't jump the gun with their new product but waited until the micro was in its final form. This policy is being continued with their peripheral products, such as the disk drives and printer, which went on sale to the public in November and which are reviewed in this issue.

Since the micros began appearing in high street stores interest in the CPC464 has grown rapidly along the grapevine of computer users. For as little as £239 you can buy a complete system to take home and start using immediately. Sadly, although 200,000 units will be in the UK by Christmas and most of these in homes, software houses have been slow to produce programs for it. Their reasoning is that they've been caught out in the past by stocking up for machines which didn't have the success predicted for them, so why should this be any different?

The New Year should see a reversal of this situation. The software arm of Amstrad, Amsoft, are marketing other companies' programs under licence at a rapid rate and several OEM companies are developing peripherals.

This issue contains plenty to interest existing CPC464 owners or anyone thinking of buying one. Our special Dossier contains articles on all aspects of programming the micro and has reviews of hardware and software products. There is even a review of one of the first books on the CPC464 to hit the shelves.

For those programming novices among you who haven't got a CPC464, there is also plenty to suit. This month we begin a new tuition course on the language, BASIC. It will run for several months dealing with different aspects of programming each time. The VIC20 Basics series moves into machine code and there is a very useful article and program to cut down data storage space in your programs.

Spectrum owners will be interested in our Testbed this month which contains test reports of a whole range of add-ons from interfaces to speech synthesisers and data storage.

There's also a lot more in this issue of *PCT*. It is crammed with reviews of software and books and there are plenty of programs for you to type in. In fact, this issue will open up a whole New Year of Computing fun!

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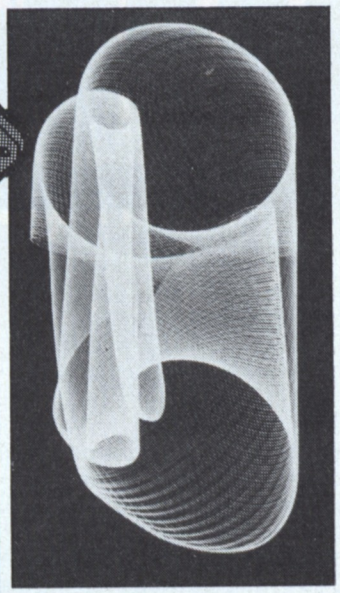

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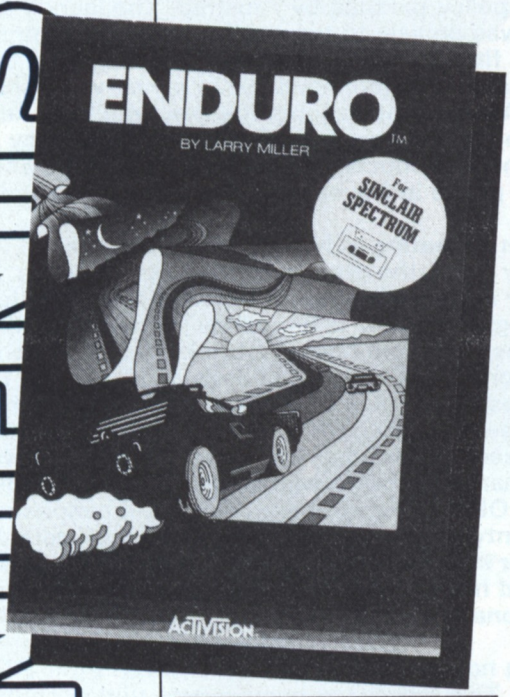

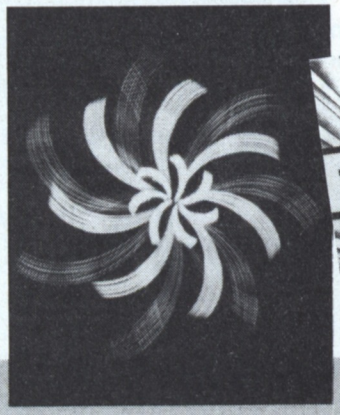

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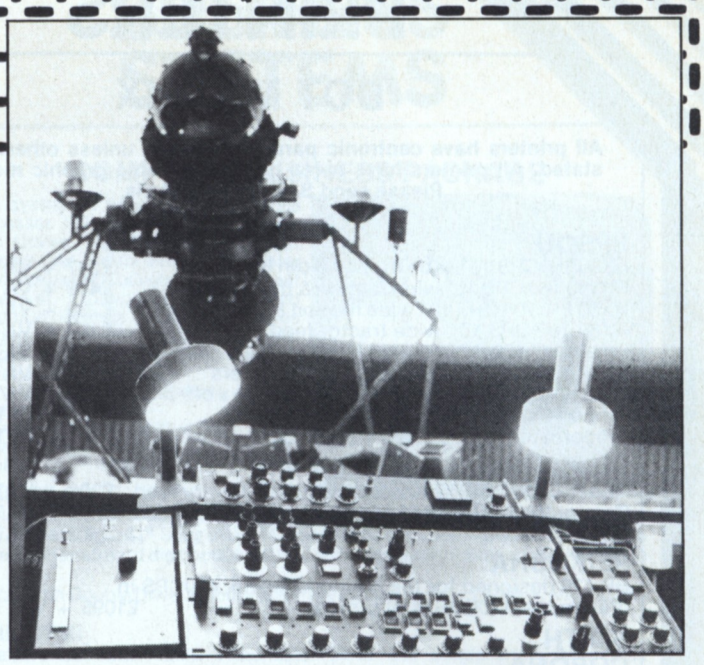

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All printers have centronic parallel interface unless otherwise stated. All printers have hi-res dot addressable graphic mode. Please send SAE for full details.

EPSON

FX80 160CPS 10" wide friction & pin feed	£347 + VAT	**£399**
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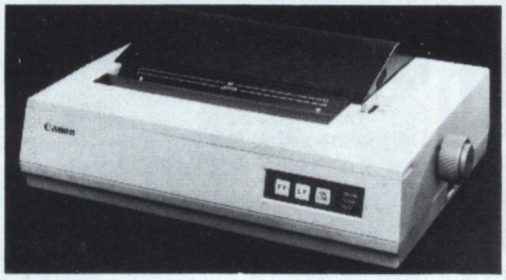

COLOUR PRINTERS

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DAISYWHEEL

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WE STOCK A LARGE RANGE OF SOFTWARE FOR BBC MICRO INCLUDING ACORNSOFT, BBC SOFTWARE, LONGMANS SOFTWARE, PLEASE SEND LARGE STAMPED ADDRESSED ENVELOPE FOR FULL DETAILS.

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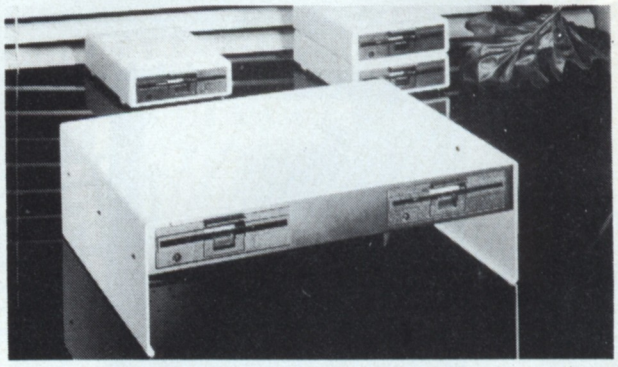
DISC

100% BBC COMPATIBLE MITSUBISHI AND TEAC SLIMLINE DISK DRIVES



These drives are supplied ready cased with all the necessary cables formatting program and User Guide
There are some very useful utilities included on formating disc e.g.

* DISASSEMBLER: This is 6502 machine code disassembler
* DUP: To copy and rename a file on disc
* FORMAT: Formating progam for 40 & 80 tracks
* FREE: This utility provides a disk usage analysis
* MDUMP: Enables you to display and modify any part of BBC memory
* MERGE: Merge a number of text files into one file
* RELOCATE: Downloads a basic program to &E00
* SDUMP: Screen dump for EPSON In all graphic modes
* VERIFY: Verifies every sector on a disk
* MENU: A flexible menu program

PRODUCTS

BBC Microcomputer Model B	£348 + VAT	£399
BBC Mod B - disk interface	£409 + VAT	£469
BBC Mod B - Econet interface	£389 + VAT	£447
BBC Mod B - disk and Econet interfaces	£450 + VAT	£517
BBC Compatible 100K disk drive	£86 + VAT	£99
BBC Compatible dual 800K disk drive	£312 + VAT	£359
Acorn Z80	£347 + VAT	£399
Acorn 6502 Second Processor	£173 + VAT	£199
Acorn Bit stick	£327 + VAT	£375
Acorn IEE Interface	£282 + VAT	£325
Acorn Electron plus 1 interface	£52 + VAT	£60
BBC Prestel Adaptor	£115 + VAT	£132
BBC Telext receiver (Aug)	£196 + VAT	£225
BBC cassette recorder and lead	£30 + VAT	£35
Disk interface kit (free fitting)	£89 + VAT	£103
Mod A to Mod B upgrade kit	£70 + VAT	£80
Fitting charge for A to B upgrade kit	£20 + VAT	£23
16K memory upgrade kit	£30 + VAT	£34
Games paddles	£17 + VAT	£19
User Guide	£10	
Advanced User Guide	£12.95	
Econet Guide	£ 7.50	
Econet interface (free fitting)	£60 + VAT	£69
Speech interface (free fitting)	£47 + VAT	£54
BBC disk manual - formating disk	£30 + VAT	£34
Parallel printer cable	£10 + VAT	£11
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Dual drive 200K 40 trks single sided	£164 + VAT	£189
Single drive 200K 40 trks double sided	£138 + VAT	£159
Dual drive 400K 40 trks double sided	£260 + VAT	£299
Single drive 400K 80 trks double sided	£152 + VAT	£175
Single drive 400K 40 80 trks switchable DS	£155 + VAT	£179
Dual drive 800K 80 trks double sided	£303 + VAT	£349
Dual drive 800K 40 80 trks switchable DS	£312 + VAT	£359
Dual Drive 800K 40 80 trks + PSU + built in monitor stand	£373 + VAT	£429

All above drives are low power slimline (0 3 A typ at + 12v and 0 4 at + 5v per drive) Normally extra power supply is not required. The BBC Computer power supply is designed to drive to low power drive (IT IS NOT DESIGNED TO DRIVE INTERNAL ROM BOARD)

SS DD disketts (10 Box)	£18 + VAT	£20
DS DD disketts (10 Box)	£23 + VAT	£26

BUSINESS SYSTEMS

COMPLETE BUSINESS PACKAGE

This system is based on 16 Bit 8088 Processor 128K RAM, 2X730K Floppy Disc Drives, High Res Monitor, fast (160cps) Dot Matrix Printer, Wordstar Wordprocessor, Calcstar Spreadsheet Program, complete integrated Accounts package consisting of Sales Ledger, Purchase Ledger, Nominal Ledger, Invoicing, Stock Control, Payroll and mailing list.
Complete turnkey system at an unbelievable price.
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"Portable Executive Computer" 16 Bit Micro. 256K RAM up to 1.44 megabytes flopy disk storage. 3½" Sony disks. Portable brief case styling. Modem with auto dialler (optional) hard disk optional. Vast software library (compatible with Sirius 1).
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APRICOT XI
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£2995 + VAT **£3444**

SANYO PROFESSIONAL COMPUTER

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16 Bit Micro 128K RAM expandable to 256K. Single or Double Disk drive built in full colour graphics (640 x 200 pixels in 8 colours) IBM compatible. Free software. Sanyo MBC 550 128K RAM single drive and free software including Wordstar and Calcstar
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£999 + VAT **£1149**

SANYO 550-730
As 550 but with 2 x 730K Drives
£1049 + VAT **£1206**

SANYO 555
Sanyo MBC555 128K double drive and free software including Wordstar, Calcstar, Inforstar, Datastar etc.
£999 + VAT £1149

SANYO 555-360
As 555 but with 2 x 360K Drives
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SANYO 555-730
As 555 but with 2 x 730K Drives
£1299 + VAT **£1494**

SANYO SYSTEMS INCLUDE FREE HIGH RES GREEN MONITOR

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BBC 1: BBC Micro Model B, View (or Wordwise) Wordprocessor, Quendata 20 CPS Daisywheel Printer, High Res Green Monitor, Cassette Recorder plus 10 cassettes and all the necessary cables £650 + VAT = **£747.50**

BBC 2: BBC Micro Model B + Disk Interface, View (or Wordwise) Wordprocessor, 100K Disk Drive, High Res Green Monitor, Quendata 20 CPS Daisywheel Printer, 1 Box of Disks and all the necessary cables
£799 + VAT = **£918.85**

BBC 3: Same as System BBC2 but with 400K Drive
£875 + VAT = **£1006.25**

BBC 4: Same as System BBC 2 but with 400K Drive and JUKI 6100 Daisywheel Printer
£975 + VAT = **£1121.25.**

BBC 5: BBC Model B + Disk Interface, View (or Wordwise) Wordprocessor, 800K Dual Disk Drive (Mitsubishi), High Res Green Monitor, JUKI 6100 Daisywheel Printer, 1 Box (10) of 80 Track DS discs and all necessary cables £1145 + VAT = **£1316.75.**

SAN 1: Sanyo MBC 550 Series 16 Bit Microcomputer, 128K Ram, Dual 160K drives (2 x 160K), High Res Graphics (600 x 200 pixels in 8 colours), JUKI 6100 Daisywheel Printer, High Res Green Monitor, 1 Box of 10 discs, Wordstar Wordprocessor, Calcstar spreadsheet and all the necessary cables £1175 + VAT = **£1351.25**

SAN 2: Same as SAN 1 but with Dual 360K Drives (2 x 360K)
£1345 + VAT = **£1546.75**

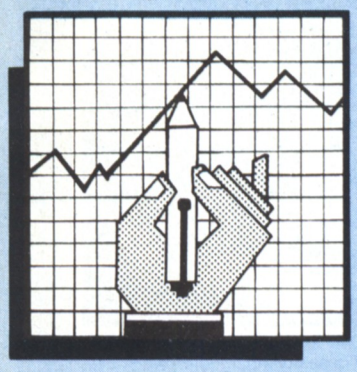
SAN 3: Same as SAN 1 but with Dual 720K Drives
£1395 + VAT = **£1604.25**

SAN 4: Sanyo MBC 555 Series 16 Bit Microcomputer, 128K Ram, Dual 160K Drives (2 x 160K), High Res Graphics (600 x 200 pixels in 8 colours) JUKI 6100 Daisywheel Printer, High Res Green Monitor, 1 Box of 10 discs, Wordstar, Wordprocessor, Calcstar spreadsheet, Mailmerge, Spellstar (dictionary), Datastar (database), Reportstar plus all the necessary cables
£1295 + VAT = **£1489.25.**

SAN 5: Same as SAN 4 but with Dual 360K Drives
£1475 + VAT = **£1696.25**

SAN 6: Same as SAN 4 but with Dual 730K Drives
£1525 + VAT = **£1753.75**

If you require High Res Colour Monitor instead of High Res Green Monitor in Sanyo Systems please add £320 + VAT = £368 to the above prices.
***128K RAM Upgrade for all above Sanyo systems (makes a total of 256K RAM) £150 + VAT = £172.50 including fitting.**



News

SINCLAIR'S NEW MICRO?

Sinclair kept their new machine closely under wraps until delivery to dealers was complete. New machine? Well, hardly, more like a Spectrum in QL's clothing!

Named the Spectrum Plus (+), the basic computer is identical to its predecessor in all respects but one. In an effort to improve the never popular keyboard. Sinclair have re-clothed the Spectrum in a cut-down QL case. This gives the Spectrum+ a professional keyboard with proper keys and a space bar. They have also added 18 keys enabling the user to perform all operations with a single key stroke.

Of course, the Spectrum+ costs more. At £179.95 complete with six applications programs, you will in effect end up paying £50 for a new keyboard since dealers are now selling the old Spectrum with the same six programs for £129.95. For a better bargain, consider buying the Nordic FDS Executive keyboard and an old style Spectrum. Be quick, though as the 'old' Spectrum may no longer be produced.

TOUCHING ON POTENTIAL

A touch sensitive pad, complete with its own microprocessor and software, promises to attract a sector of the market, resistant to keyboard usage, to computers. Touchmaster Limited see their product being put to prime use in industry and by young children.

The Touchmaster has an A4 working surface and a resolution of 256 × 256. The surface is fully linear across the active area and does not use any moving switches or similar devices. The first units will be available for the BBC, CBM64, Dragon, Spectrum and VIC20 computers, but the company hope to expand the range to all home computers.

The package will contain the Touchmaster, all accessories necessary for immediate use with a home computer and the Touchware multipaint graphics program. It will be available in major department stores and specialist computer dealers at a recommended retail price of £149.95.

ROMIK AT THE FOREFRONT OF NEW TECHNOLOGY

The Commodore 16, Plus 4, Amstrad CPC464 and Touchmaster are to benefit from Romik's research and development throughout the summer months. They have been busy producing software to meet the expected demand of these new products. In addition, their breakfast time game 'Weetabix versus the Titchies' is now enjoying major publicity on television and in the high street stores.

Romik plan to re-attack the games market with an advertising campaign featuring their new adventures and arcade games. They have been rewarded in their endeavours by completing an important marketing deal with Boots and Menzies who are to stock all their CPC464 games, and have sealed a manufacturing agreement with Thorn EMI to produce them.

EUREKA! BIG PRIZE GAMES HIT THE SOFTWARE INDUSTRY

With the big Fleet Street papers generating so much interest and high sales in their various 'bingo' style games, I suppose it was only a matter of time before the software Industry latched onto the idea as well.

First there was Incentive's 'Splat' with cash prize, closely followed by Haresoft's 'Hareraiser' treasure hunt for the £30,000 jewelled hare. More recently Commodore have been offerring prizes up to £1 M for winners of their 'Spirit of the Stones'. Now Domark have entered the fray with 'Eureka!' worth £25,000 to the first person to unlock its secret.

The program for Spectrum and CBM64 contains five complete adventures and arcades making it one of the largest computer games of all time! The prices are £14.95 for tape and £16.45 for CBM64 disk. Eureka! is on sale all around the world, so don't hang about!

COMMODORE TO SPONSOR NATIONAL SCHOOLS' COMPUTER QUIZ

In a move to initiate greater educational interest in the Commodore 64, Commodore are joining up with the British Computer Society in their 1985 Schools' Computer Quiz.

Sponsoring the project to the tune of £50,000, Commodore say they are delighted to be able to demonstrate their objective of helping schools to own their own computers. Alongside this support, Commodore is also running a special schools' loan and sponsorship scheme. Every school taking part in the quiz will be offered the free loan of two complete Commodore 64 computer systems for three months. If at the end of this period the school wishes to keep the systems, Commodore will match every £7 the school raised with £3. The sponsorship scheme on its own is open to all schools.

The quiz is being run along the lines of 'Top of the Form' with a quiz master and six to eight team and indiviual rounds of questions. Schools in each area will be asked to select a team of three pupils to represent them.

Each team in the branch finals will receive a Commodore modem worth £100. The 40 branch finalists will go on to compete in eight regional finals to win prizes of CBM64s and disk drives. The overall winning school in July 1985 will receive £1,600 worth of Commodore printers and peripherals with the runner up getting £700 of Commodore equipment. Details of the Quiz are available from Education Authorities.

GROUP ENTRY INTO BUDGET PROGRAMS

When Mastertronic rocked the software market last April with the announcement of cheaper games for home enthusiasts, their competitors attacked the project with the jibe that 'you only get what you pay for'. The buying public were not to be put off, however, and Mastertronic have gone from strength to strength. Other companies have been quick to follow suit, the latest being a coalition formed by CRL, Silversoft and Anirog, who are marketing 12 games for a range of micros under the title Omega Software. All the games cost only £1.99 and are available for the Spectrum, ZX81, Commodore 64, and VIC 20.

Software Projects too are cutting their prices on a range of original games for the CBM64, VIC20, Spectrum and Dragon. These 'Software Supersavers' will be distributed by a nationwide agent network and will retail for £2.99.

Mastertronic themselves have just released four new games, including conversions to the CBM64 of Space Walk and BMX Racers. A new game for the CBM64 is Starace, and Challenger has been released for the BBC Micro. They have also concluded an important distribution deal with the games supplier Beau-Jolly to retail their products through Mastertronic's 60 strong sales force. To provide back-up, £250,000 will be spent on television advertising. There will be special Christmas packs of games; six packs for the Commodore 64, Spectrum and VIC20 and a four pack for the Spectrum 16K.

Following an announcement by Rocksoft that Mastertronic's game 'Chiller'' had been withdrawn from sale because of infringement of their copyright on the theme music, Mastertronic have issued a statement to the effect that the game will continue, but with different music. The game has been a top seller for the CBM64 and costs £1.99.

PROFESSIONAL BUSINESS PROGRAMS FOR THE HOME

Fully fledged professional business software is being marketed by Audiogenic for the CBM64. Competitively priced, the suite of programs are the Micro Magpie Database, Micro Swift Spreadsheet and Micro Wordcraft Word Processor, a set of programs to cope with all your household needs.

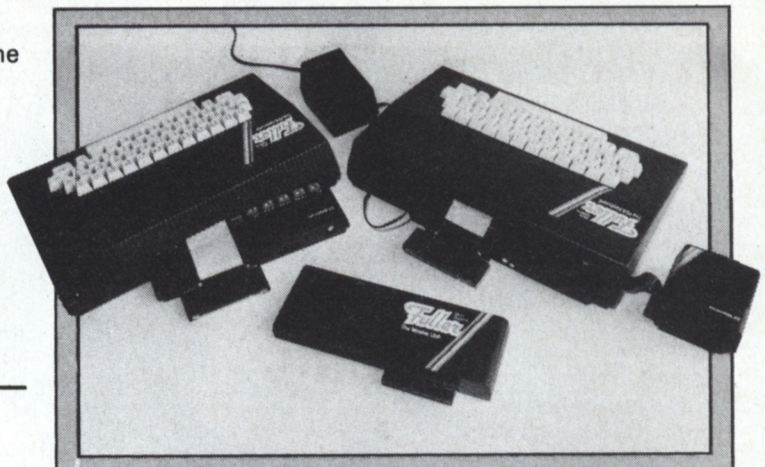
Micro Magpie is a development of the original Magpie database and retains all the advanced features of the original. It costs £39.95 and comes complete with a free mailing list, stock control applications and a new manual.

Likewise Micro Wordcraft is virtually identical to its predecessor but Micro Swift is a brand new spreadsheet written by Dave Middleton, the author of Magpie. It is notable for the innovative use of pop-up menus to control the various program facilities. All three programs are written in 100% machine code and contain the Audiogenic Centronics Interface software to facilitate the parallel printer option. Micro Wordcraft and Micro swift are available on disk for £24.95 and £19.95 respectively. The latter is also available on tape.

ADD ON KIT DISKS FOR EINSTEIN

Owners of the Tatung Einstein are now able to double the machine's total disk drive capacity to 1 megabyte with the arrival of a second integral disk drive unit in kit form from Tatung.

Designed to reduce the cost to the end user, the kit can easily be fitted inside the Einstein housing and costs £149 including VAT. The micro was designed and built with the necessary electrical connections and space allocated inside the housing specifically for this purpose.



ALTERNATIVE SPECTRUM PLUS

If you don't like the idea of the 'QL type' keyboard of the new Spectrum+, consider the possibility of improving the old style Spectrum by adding a Fuller keyboard.

The future of Fuller Micro Systems has now been assured through the acquisition of its holdings by Nordic Keyboards. Nordic is now set to launch the FDS Executive, a replacement keyboard for the ZX Spectrum costing £59.95.

With a pre-cut panel snapped out of the back of the keyboard both Spectrum and Interface I fit inside the case with the Microdrive neatly plugged into the side. The Executive also retains the additional keys providing cursor control and delete function in addition to a full sized space bar.

Nordic Keyboards have used the Fuller trademark because they want to retain the identity but stress that they have not taken on Fuller's legacy of poor delivery and service problems. They are building up stocks of all products and claim delivery in three days.

'TIME FOR PLAY' SAID ZEBEDEE

I don't know what Dougal would have made of it. Being a TV star is one thing but making the adjustment to computer creature might prove too much of an excitement for the gentle grump of Magic Roundabout fame.

Still, CRL have gone and done it! Dougal and his friends have been magnetised into their latest peaceful arcade game. Poor Dougal tries to get on with his task of building a suger house (which on its own is something of an achievement for a dog of little brain), only to be thwarted by his hungry friends gorging the sugar cubes!

Full graphics representation of the delightful characters make this a lovely non-violent game for children of all ages. For the Spectrum and CBM64, Magic Roundabout costs £6.95.

IMAGINE A NAME

The name of the innovative but ill fated Liverpool software house, Imagine, is to go on. Ocean Software has completed final negotiations with Imagine's Liquidator for the purchase of a major portion of their assets including the name, logo and trading style.

The package also includes some of Imagine's completed programs. Ocean are considering a relaunch of the label and have employed eight of the ex-Imagine programming team on a contract basis.

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C. SAISNO DR 70
C. COMMODORE 1530

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Screen Compression

The memory occupied by hi-res screens often detracts from their use. This article by David Ellis shows you how to reduce their 'storage space' and should be read in conjunction with his 'Squash' program elsewhere in this issue.

High resolution graphics are an important and useful aspect of programming but you can very easily reach the ridiculous stage of filling your computer's RAM with just a copy of a screen picture, leaving no room for your program!

A typical hi-res screen will occupy around 8K and can be saved to tape or disk allowing a 'library' of pictures to be built up for use in later programs. However, a cassette based storage system takes a very considerable time to store or re-load these pictures which is very frustrating.

A look at many hi-res pictures will reveal subtle divisions with many areas being blank or similar to other parts of the picture. This is one obvious area where space can be saved. If, for example, there were 200 consecutive 64's stored in memory, the 200 bytes could be reduced to 3 by using the following code: 51 200 64; where 51 is a 'marker' number which instructs the program to repeat the number 64 200 times. Other markers and techniques can be used and these are explained later in this article.

This kind of marker system is the one used on memory bit-mapped screens, i.e. where the binary bit pattern of a memory location is displayed on the screen, such that the zeros are in the background colour and the ones in the foreground colour.

The colour and attributes may be stored on the screen as in the Oric/Atmos, or held in another part of memory as an attribute file as in the Spectrum. The program I have written is for the Oric but the actual methods could be easily implemented on any memory mapped display and also on attribute files if required.

Theory explained

Take a look at Figure 1 which is a theoretical hi-res screen of eight columns by ten. Each location contains an eight bit number. The resolution is therefore 64 pixels across (8 × 8) by 10 pixels down. Not quite hi-res I agree, but sufficient to explain the theory.

The numbers are very similar to a section of the Oric hi-res screen, where 16 is the background colour, 00 the foreground colour, 64 a blank cell and the other numbers being various 'lines'. Since there are only 40 columns across as opposed to 200 lines down, it is simpler to check the former (although ideally a program should check both ways to see which method gives the shorter code). As a demonstration use the example given here to see which way is the most efficient.

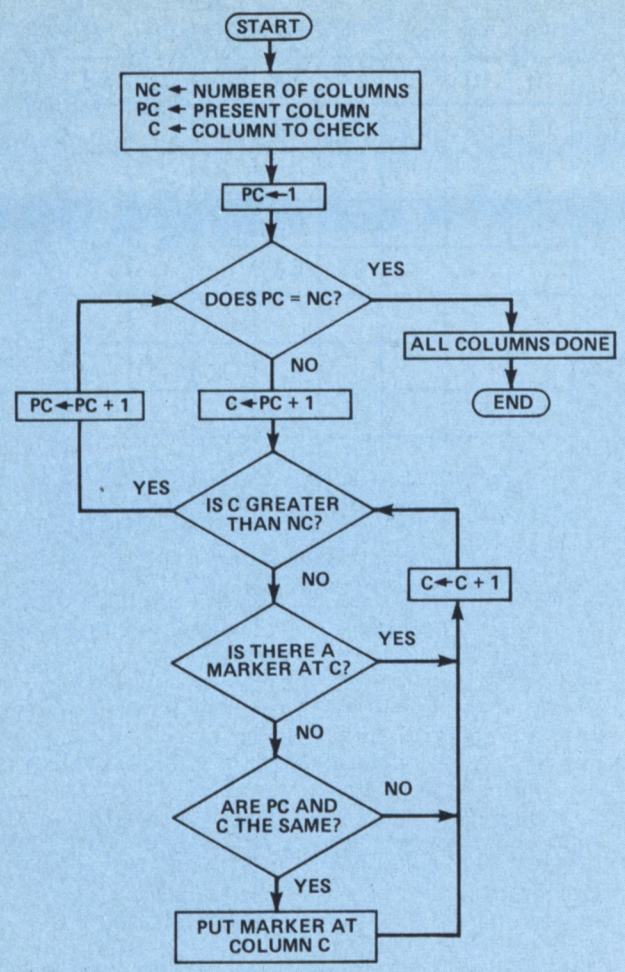
To do this, first check each of the columns to see if any are identical. A quick glance at our example will reveal that columns 3 and 8, 4 and 7 and 5 and 6 are the same. The computer has to follow a logical method of checking through and this is demonstrated by Flowchart 1.

If the column being checked (C) is the same as the column being compared (PC), then a marker is placed at the beginning of column C, followed by the PC number. In the Oric program (Squash) the number 50 is used for the marker. If this marker is found at the beginning of a column during the checking process then there is no need to check that particular column — it is the same as a previous column. After checking all the columns the block of memory will have been reduced to what is shown in Figure 2.

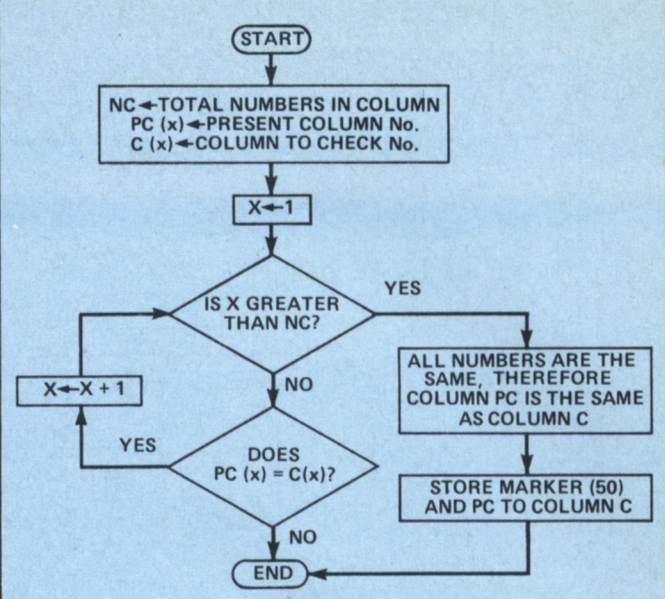
It can be seen that the last three columns have been reduced from 10 bytes each to 2 bytes thus saving 24 bytes. The algorithm used by the computer to compare the numbers in two columns is shown in Flowchart 2. Note that the checking of

Figure 1 The 80 memory locations before compression

COLUMNS 1	2	3	4	5	6	7	8	ROWS
16	00	64	64	64	64	64	64	1
16	00	64	64	64	64	64	64	2
16	00	64	79	79	79	79	64	3
16	00	64	97	64	64	97	64	4
16	00	64	97	64	64	97	64	5
16	00	64	97	64	64	97	64	6
16	00	64	97	64	64	97	64	7
16	00	64	97	64	64	97	64	8
16	00	64	97	64	64	97	64	9
16	00	64	97	64	64	97	64	10



Flowchart 1 Checking to see if columns are the same



Flowchart 2 Comparing the numbers between two columns

a column is terminated if the two numbers are different. If all the 200 numbers are the same then the columns are identical and the marker and column number (PC) are placed at the beginning of column C. This part of the program is time consuming and has been written in machine code to speed it up.

The checking time for each subsequent column will decrease as the number of columns for it to be checked against reduces. Column 39 for instance only needs to be checked against column 40.

The next stage of the process is to compare the numbers in each column to see if there is a sequence of numbers that is repeated. As this will always use up three bytes (marker, number, character) it will only be of benefit if there are four or more sequential numbers. This stage is probably the most difficult and time consuming part of the whole process.

There is a useful 'spare' line on the Oric between the end of the hi-res screen and the start of the three text lines. The number 52 is poked into these locations which acts as an end of line marker for this part of the program. A simplified algorithm for the process is given in Flowchart 3. Any column beginning with the marker '50' will not need to be checked, of course. This part of the 'Squash' program is also written in machine code for speed, although any of the algorithms could be written in BASIC with a consequent loss of speed.

How long the process takes depends on your computer and the efficiency of your programming. If you spend several hours building up a hi-res picture, then the time taken for the coding process is perhaps not so important. As a rough guide the Squash program will decode the 8000 bytes in a matter of seconds, but this depends on the complexity of the screen picture. The example we have been using will be in the form shown in Figure 3 after the final coding stage.

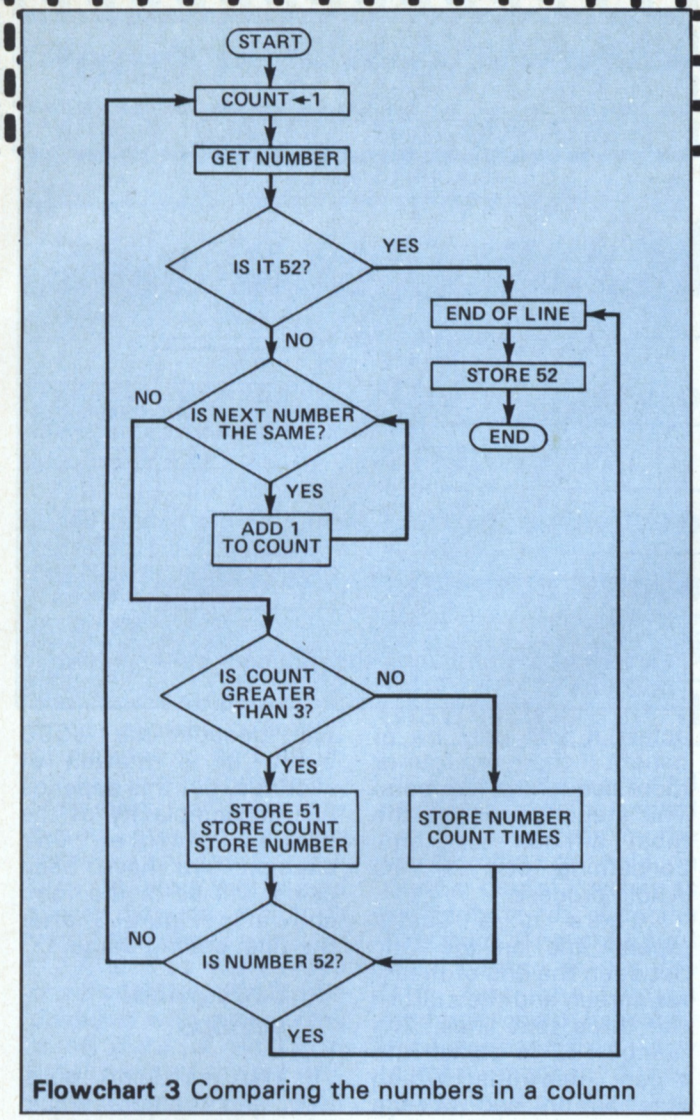
Substantial savings

The remaining numbers and markers would have been stored to another part of memory during this last 'pass' to produce the final list of coded numbers. The end of line marker (52) is also stored but not when the column begins with 50. '53' marks the end of the last column which will always be the last number in the list. The list of numbers in our example (Figure 3) will therefore be 51,10,16,52,51,10, 00,52 etc.

Our original 80 numbers have been reduced to 33 — a saving of nearly 60% which is very significant. In fact, many hi-res pictures will achieve a better figure than this, being typically 70-90% for moderate pictures. In some cases the

Figure 2 The 80 memory locations after comparing the columns

16	00	64	64	64	50	50	50
16	00	64	64	64	05	04	03
16	00	64	79	79			
16	00	64	97	64			
16	00	64	97	64			
16	00	64	97	64			
16	00	64	97	64			
16	00	64	97	64			
16	00	64	97	64			
16	00	64	97	64			



Flowchart 3 Comparing the numbers in a column

51	51	51	64	64	50	50	50
10	10	10	64	64	05	04	03
16	00	64	79	79			
			51	51			
			07	07			
			97	64			
52	52	52	52	52			53

Figure 3 The 80 memory locations after comparing the numbers in each column

saving may be very small. In very extreme cases it may actually take more than 8000 bytes (8040 is the maximum if every screen location was different). This is most unlikely though, especially if you keep the checking process in mind when making up hi-res pictures.

Decoding

Having coded the screen picture in this way, we now have to have a decoding program for when you want to recall the picture. Fortunately, this is a lot easier than the coding program. In the Squash program the markers 50,51,52 and 53 will be checked for and the appropriate action taken as shown in Flowchart 4. Machine code is used again here. BASIC would achieve the result but is much slower and speed is important. The decoding on the Oric takes well under one second regardless of the picture complexity.

Is it worth it?

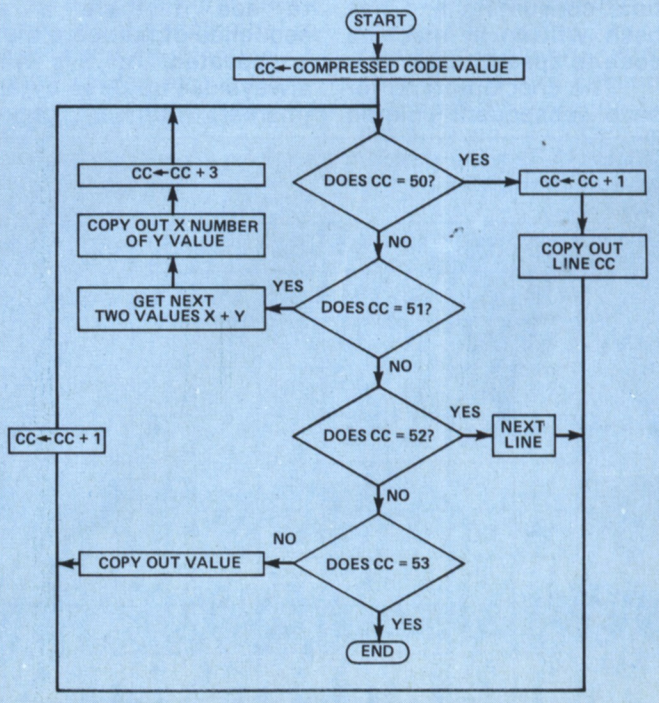
You may well be asking yourself what is the point of this coding/decoding sequence when in many instances a BASIC program containing the necessary line drawing commands etc would use up less memory than the coded list of numbers. This may be true, but a block of numbers can be manipulated more easily than can a BASIC program, and some BASIC programs may take ages to draw a picture. This is especially true where three dimensional functions are plotted.

Also you will be able to store greater quantities of pictures to tape or disk — at least three to four times more. It also means that you can load in three or four pictures in the time it would normally take for one. On the Oric it is possible to store about 15 to 20 such pictures. By pointing to the start of each block of condensed code the pictures can be 'flicked' through one at a time.

If you do attempt to write a screen compression program for your computer the information given in this article will give you some ideas. Try to split the problem up into subroutines and use flowcharts as much as possible. Without the aid of flowcharting, a complex problem like the one we are dealing with here, would probably result in a tangled mess of a program. I wish you the best of luck!

Now, turn to the Squash program later in this issue.

Flowchart 4 Decoding the compressed code and copying to screen



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Cassette File Handling

The CPC464's built-in data recorder is quick, reliable and easy to use. David Ellis introduces you to sequential file handling and record manipulation.

The Amstrad CPC464's inbuilt cassette recorder is quick, reliable and well supported from BASIC making it a joy to use. The documentation, however, is scanty with regard to sequential file handling and this article is an attempt to explain it in more detail.

There are two speeds on the data recorder; a 'supersafe' one of 1000 baud (125 bytes per second) and a 'speedload' of 2000 baud (250 bytes per second). The standard default rate is 1000 baud. SPEED WRITE 1 will set the recorder to the 2000 baud rate and SPEED WRITE 0 will return it to the default value. When re-loading data from tape, the speed at which it was originally saved can be detected by software. The various ways of saving data are detailed in Table 1.

File facilities

The CPC464 has the ability to MERGE, CHAIN and CHAIN MERGE files, the latter merging another program while retaining all current variables.

The CAT command is essentially the same as DIR on disk drive systems. This lists all the files on the tape together with details of what type of file each is, so you can sort out all your library with ease! CAT is also used for identification purposes.

Programs and data are stored to tape in 2K blocks (2048 bytes) and during loading (or saving) the filename and block being read are displayed on the screen. Estimation of the file length can then be made by multiplying the number of blocks by 2K.

By entering a '!' sign before the filename, you can suppress the screen message, a facility which is essential in a program loading in data periodically such as a long adventure game. Read errors are well catered for and cassette operations are easily aborted by the use of the escape key.

Down to sequentials

What is a sequential file? I will attempt to explain.

Files are used for holding information of any description and all the details are sorted into 'records'. A disk operating system supports both RANDOM and SEQUENTIAL files. With a RANDOM file data can be written to or read from any position, allowing immediate access to any of the records in the file. Each record is further divided into 'fields', the number and length of which are set by the programmer. For example one could have a NAME, ADDRESS AND TELEPHONE NUMBER field within one record.

A sequential field on the other hand usually contains records of variable length, each one being tagged onto the end of another. Fixed length records can be created if required but no fields are possible, although I will show you that 'simulated' fields can be set up. Figures 1 and 2 illustrate the difference between random and sequential files.

Creating a sequential file

Type in Program 1. Line 10 opens a file called 'NAMEFILE' for output to the cassette. Enter as many names, addresses and telephone numbers as you like. The PRINT #9 statement puts the string onto the tape (#9 being the cassette stream).

As you enter the data it will seem as if nothing is saving to the tape. This is because the data is first stored in a 2K RAM buffer and only when this is full, will its contents be transferred to tape. This system of operation is extremely quick by cassette standards.

The CLOSEOUT command closes the 'NAMEFILE' and puts an 'END OF FILE' (EOF) marker onto the tape. Now, you can try to read back the 'records' in the

Table 1 Data saving commands

SAVE "FILENAME"
Will save a standard BASIC program called "FILENAME" which can be up to 16 characters in length.

SAVE "FILENAME", A
Will save FILENAME in the form of an ASCII text file which is useful for saving data created by a wordprocessor for example.

SAVE "FILENAME", P
Write protects the data on the cassette by scrambling it so that it cannot be listed or broken into.

SAVE "FILENAME", B
Binary save used for dumping blocks of memory (e.g. screen contents) onto cassette. The start address of the block followed by a number of bytes to be saved must be added to the end of the command.

Record No.	Name Field 1	Address Field 2	Phone No. Field 3
078	JILL	LONDON	01-222-8653
132	BOB	BIRMINGHAM	021-773-7500
014	PETE	BRISTOL	06-387745
027	SARAH	LEEDS	81-364-4536
119	FRED	ABERDEEN	0683-44872

Figure 1 Random file arrangement — DISK only

file by typing in Program 2. Line 200 opens the file for input from the cassette (naturally you will first have to rewind the tape to the beginning). This is the main limitation of the sequential file system. You will have to start at the beginning of the file and search through all the 'records' until you find the one you want. Nor can you append records directly.

File manipulation

If you need to add more records to the file or to change it in any way you will have to save the whole file to tape together with the amendments. Line 210 in Program 2 checks for the 'End of File' marker and returns −1 when it is found. Data is read from the tape into FILE$ and printed out until the EOF marker is reached.

Here again an input buffer of 2K is used to store the data being read from tape. Note that any variable name can be used to read in the data. You must be careful to use the variable which corresponds to the one the data was saved with. If you saved a list of numbers using the variable 'COUNT', then you could not read them back using 'NUMBER$' or a 'TYPE MISMATCH' error would result. In fact it is better to store all data to sequential files using a string variable by converting numeric values using the STR$ function and then reconvert them by use of the VAL function when reading the data from tape.

Setting up a file

Reading your data into an array will result in easier manipulation. Programs 3, 4 and 5 show the sort of operations that are likely to be needed with a name/address/telephone number file.

Program 3 reads the records into the RECORD$ array which has been dimensioned for a maximum of 200 records. You can alter this number to suit your purpose bearing in mind the RAM you have available.

Program 4 searches the whole file for the occurrence of any character or string that you require. UPPER$ is an Amstrad command that converts all characters in a string to upper case so that 'bill', 'Bill' and 'BILL' are recognised as being the same. By stepping through the array it is possible to search or list a particular field. The 'NAME' will be in records 1, 4, 7, 10 etc; 'ADDRESS' in records 2, 5, 8 etc and 'PHONE NO.'in 3, 6, 9 etc.

Program 5 will list all the data in a particular field using this method. There must be at least one record in each field for the program to work correctly.

Using Program 4, you can instigate a search in any one of the fields, rather than listing all the separate fields. Finally Program 6 saves the array to tape. This would be needed if you want to add or change data in the records.

So you have all the information you need to create and manipulate records to your CPC464. Amstrad have done their research well. The CPC464 data recorder is reliable quick and pleasant to use, proving that to those of us with little money to spare for a disk drive, there is still life in the cassette recorder yet.

Record No.

1	2	3	4	5	6	
JILL	LONDON	01-222-8653	BOB	BIRMINGHAM	021-773-7500	.....etc.

Figure 2 Sequential file arrangement – DISK or CASSETTE

program listing

```
10 OPENOUT "NAMEFILE"
20 WHILE ANYMORE$ <> "n"
30 LINE INPUT "Enter NAME ";NAME$
40 PRINT £9,NAME$
50 LINE INPUT "Enter ADDRESS ";ADDRES$
60 PRINT £9,ADDRES$
70 LINE INPUT "Enter PHONE NO. ";PHONE$
80 PRINT £9,PHONE$
90 LINE INPUT "ANYMORE DATA (y/n) ";ANYMORE$
100 WEND : CLOSEOUT
```

Program 1

```
200 OPENIN "NAMEFILE"
210 IF EOF=0 THEN LINE INPUT#9,FILES$:PRINT FILES$:GOTO 210
220 CLOSEIN
```

Program 2

```
10 OPENIN "NAMEFILE"
20 DIM RECORD$(200) : NUMBER = 1
30 WHILE EOF = 0
40 LINE INPUT £9,RECORD$(NUMBER)
50 NUMBER = NUMBER + 1
60 WEND
70 RECORD$(NUMBER) = "END OF FILE"
80 CLOSEIN
```

Program 3

```
100 LINE INPUT "Enter string to search for ";SEARCH$
110 SEARCH$ = UPPER$(SEARCH$) : NUMBER = 1
120 WHILE RECORD$(NUMBER) <> "END OF FILE"
130 FILE$ = UPPER$(RECORD$(NUMBER))
140 IF INSTR(FILE$,SEARCH$) <> 0 THEN PRINT FILE$
150 NUMBER = NUMBER + 1
160 WEND
```

Program 4

```
200 PRINT " 1 - List NAME field "
210 PRINT " 2 - List ADDRESS field "
220 PRINT " 3 - List PHONE NO. field "
230 PRINT " Press 1, 2 or 3 "
240 WHILE GET$ < "1" OR GET$ > "3": GET$ = INKEY$ : WEND
250 ON VAL(GET$) GOSUB 1000,2000,3000
999 END
1000 START = 1 : FINISH = 0 : GOSUB 4000 : RETURN
2000 START = 2 : FINISH = 2 : GOSUB 4000 : RETURN
3000 START = 3 : FINISH = 1 : GOSUB 4000 : RETURN
4000 NUMBER = START : INCREMENT = 3
4010 WHILE RECORD$(NUMBER + FINISH) <> "END OF FILE"
4020 PRINT RECORD$(NUMBER) : NUMBER = NUMBER + 3
4030 WEND : RETURN
```

Program 5

```
300 OPENOUT "NAMEFILE" : NUMBER = 1
310 WHILE RECORD$(NUMBER) <> "END OF FILE"
320 PRINT £9, RECORD$(NUMBER) : NUMBER = NUMBER + 1
330 WEND : CLOSEOUT
```

Program 6

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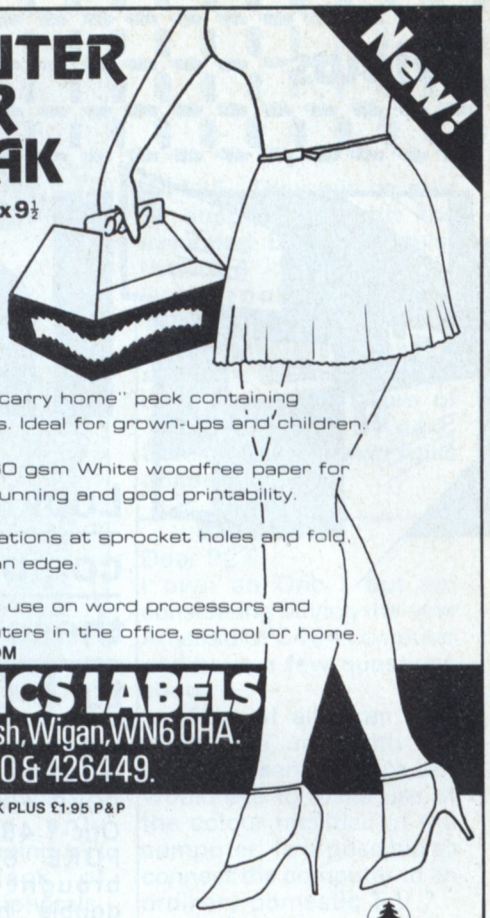

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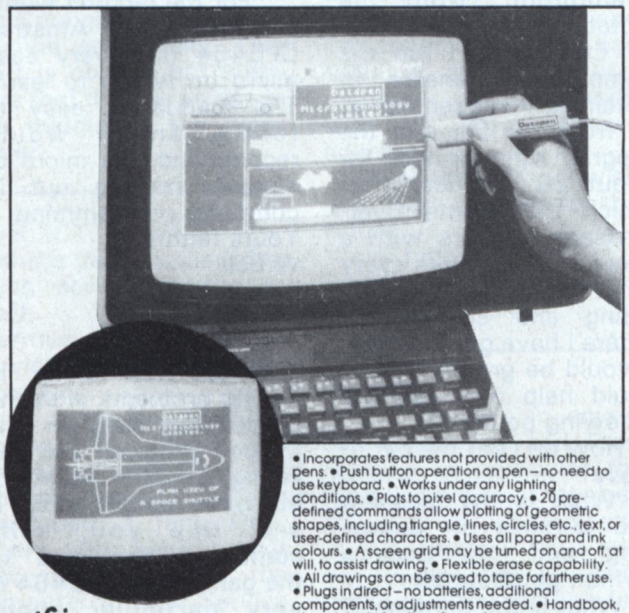

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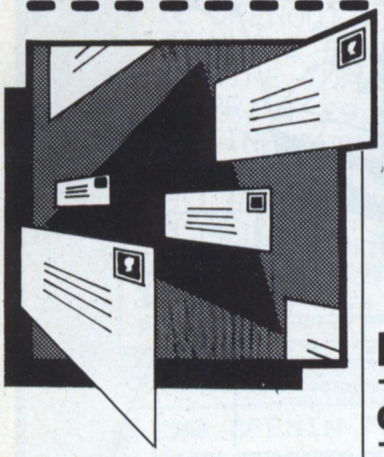


Input

Looking for a space to air your views on computing or simply needing advice? Well, these pages are all yours. Send your letters to 1 Golden Square, London WIR 3AB.

LETTERS

Dear PCT
Recently I found two POKE commands on my Oric-1 48K. The first was POKE 623,29 which brought on colours, double height graphics and text when I took the cursor to the bottom of the screen before scrolling.

The POKE 623,28 command produced some letters and symbols on the right hand side of the screen when I did the same thing with the cursor. Could you tell me what this means.
Yours faithfully
Neil Stevenson
Scunthorpe

The Oric-1 has 65536 memory locations each of which can be POKEd with a number between 0 and 255 to give 16,711,680 possible combinations. Some POKEs will perform useful functions such as changing the speed of the keyboard repeat, others will have no effect and some may cause the computer to crash.
There is no point in POKEing random memory locations unless you know what they do. It may be dangerous to do so; you will not damage the computer but you may lose any programs residing in memory.

Dear PCT
I recently bought my first home computer, an Amstrad CPC464, and have been busy typing in the listings from various magazines. I am experiencing difficulties in the recent program listing for 'Demolition' from the October issue of PCT.

Every time I run the game I am unable to obtain any movement at all from the bat and the program runs for itself for about 20 seconds, after which the 'Game Over' message appears with a score of 110 points every time. I have checked my listing and cannot see where I have gone wrong. I would be grateful if you could help me with the following points.
1. How do I get the bat to move?
2. What is the meaning and purpose of 'debugging' and how does a layman go about it?
3. What is the purpose of the 'speed key' entry at the start of the program and why does pressing key 7 as instructed make it so difficult to type in further commands?
4. How does one go about disabling key 7 for the normal entry of commands such as RUN and LIST and how does one then enable the key again afterwards?
5. Is there a printing error in line 250 of the listing or am I missing something fundamental?

For the record I would add that the Amstrad CPC464 is a very easy micro on which to learn. The manual is easy to follow and I would recommend this micro to anyone starting out in computer programming.
Yours faithfully
W Bell
Bradford

You are not alone in having problems with the 'Demolition' program. It is a good program and the listing contains no errors but many people trying it are, like you, self-confessed beginners to the game! The CPC464 is very particular about spacing, so you must make sure that spaces

between characters are entered exactly as shown in the listing. The problems with the bat arise from lines 340 and 350. You must type in the letters 'x' and 'z' in lower case if you have the caps lock off when you play the game.

Debugging is the process of finding and removing errors or bugs from a program listing. It is very easy for these to creep in when you are transferring the program from the printed matter into the computer. If possible, get someone else to check your listing — it is sometimes easier for a 'fresh' eye to spot errors you may have missed.

The 'speed key' changes the speed of the keyboard repeat. The lower the number, the faster the repeat. Line 10 in the program sets up the '7' key on the numeric keypad to a speed which should be slow enough to type at. Line 30 makes this faster to speed up the bat movement.

Details of how to define keys are given in the User Manual and finally, Line 250 is correct but make sure that there is no gap in the middle of the word 'Over'.

Dear PCT
In these days of poor after sales service and rude staff, I would like to mention the excellent service I received recently from Oric.

I purchased my Oric Atmos 48K in April this year and all was fine until recently, when a problem developed. I rang Oric, where very helpful staff told me to return the computer to their Service department. I was told not to return any of the accessories.

I posted my computer on Saturday September 22nd and on Tuesday 2nd October I rang Oric to enquire if my computer had been received safely and to ask when I might receive it back. I was informed that my computer was received by them on Thursday 27th September and despatched the same day. Imagine my surprise when the computer arrived on Thursday 4th October and I discovered that Oric had sent a brand new computer complete with manual and mains adapter.

Well done Oric. I wish you every success for the future.
Yours faithfully
B.F. Carter
Wolverhampton

Dear PCT
Thank you for an enjoyable magazine and Fred Harding in particular for 'Star Duel' (October issue). It is the best space invader game I have yet run on the TI99/4A. This micro is often decried for its comparitive slowness which I feel is more than compensated for by the colour, sound, keyboard and stunning graphics.

Indeed, my only grievance about being a TI user is the lack of software and peripherals, certainly in Glasgow anyway. I notice some books and cassettes are filtering through but I am particularly interested in the extended BASIC module to further exploit this machine's great capabilities, as I am sure many TI owners up here are. Hope you can throw some light on the matter.
Yours faithfully
F. Marshall
Glasgow

It is a sad fact that the TI99/4A is sadly neglected by almost all hardware and software manufacturers and since it is no longer on sale (apart from existing stock) the situation can only get worse.

However, one bright bit of news is that a Devon company specialise in peripherals for the Texas. They are Parco Electronics of Dorset Place, New Street, Honiton and they can be contacted by telephoning (0404) 44425. They will be able to supply you with the extended BASIC module. Intrique Software of Cranbrook Road, Tenterden, Kent (05806 4726) specialise in games software for the Texas as do Stainless Software of 10 Alstone Road, Stockport, who also have utilities.

Dear PCT
I own an Oric-1 but am considering buying the new Amstrad CPC464 computer and have a few questions about it.

First of all I can only afford the unit with the green screen monitor but would like to make use of the colour facilities of the computer. Is it possible to connect the computer to an ordinary domestic T.V.?

Secondly, will the Quickshot 1 joystick plug directly into the CPC464 and finally, is it likely that Football Manager from Addictive Games will be available for this micro in the near future?
Yours faithfully
Craig Bratt
Crewe

There is a modulator unit available from Amstrad which will allow the CPC464 to be connected to an ordinary T.V. It is called the MP-1 and costs around £40. A Quickshot 1 will plug into the CPC464 but if you want to play a two-player game you will need an Amstrad joystick as well. You cannot use two Quickshot joysticks with this micro.

Addictive Games have converted Football Manager for the CPC464. When we made enquiries the program was being tested and if all went to plan, the game should be in the shops now.

Are you only using

To play only games on a Commodore computer is like asking Albert Einstein to work out the square root of four.

The computer's brain barely ticks over.

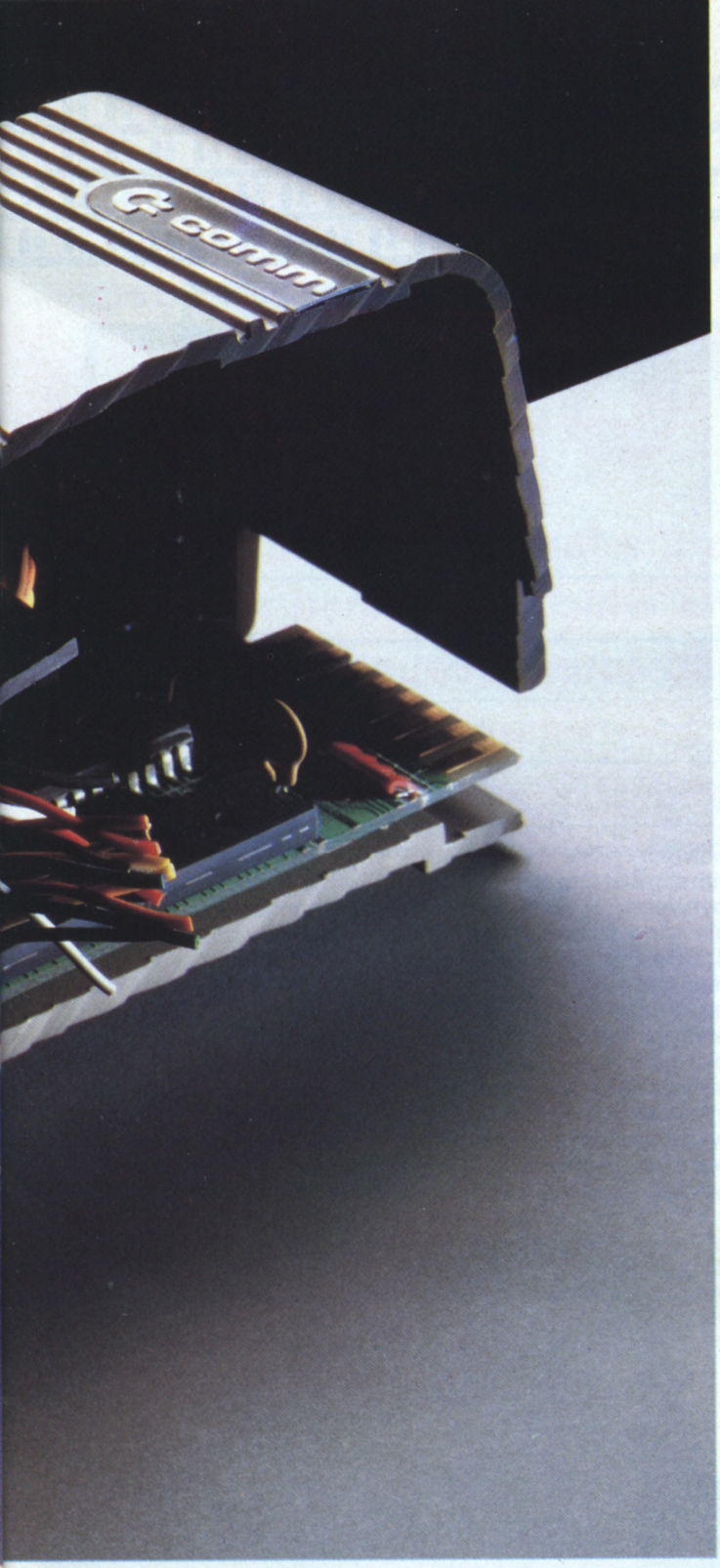
To really stretch it, you need more interesting software programs. For example, record keeping, interactive education, stimulating adventure games or word processing.

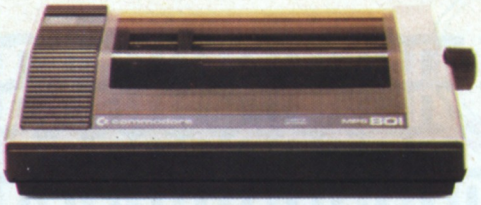
And for these you need peripherals.

Like a Commodore disk drive, a really fast storage and retrieval system with a vast memory.

Or a Commodore cassette unit, the inexpensive way of loading and storing programs.

For those who like the idea of text and graphics being more alive and having greater clarity than on a TV, there's the Commodore colour monitor.





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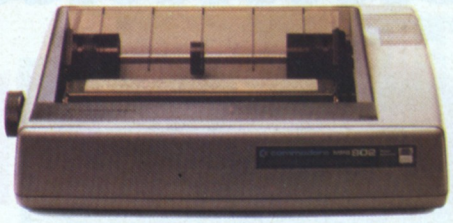

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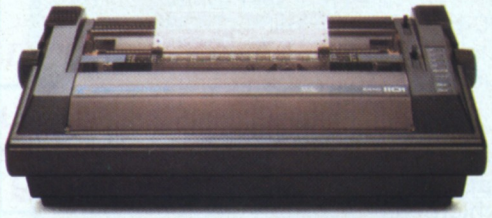

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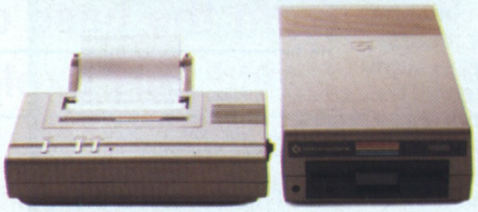

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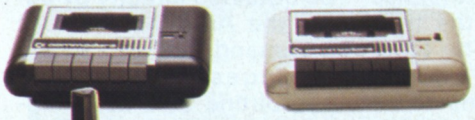

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Interrupts

The CPC464 has the facility for direct program interrupts which, combined with the windowing and sound queue facilities, form the base of a very powerful feature. David Ellis explains.

The Amstrad CPC464 has an invaluable and innovative feature which allows you to call up program interrupts directly from BASIC. Up to four interrupt timers can be set which are referred to the 'master system clock', a quartz-controlled timing system which synchronizes all the events in the computer.

The variable 'TIME' holds a value corresponding to the number of seconds the computer has been running or the time since a RESET. The timer is not updated during cassette operations so its use as a real time clock is somewhat restricted, although using the timer alone can be useful. The following routine will make a program run for a specified time:

```
10      START=TIME:
        SECONDS=60
20      WHILE TIME
        <START +300
        * SECONDS
30-998  (operations to be
        performed)
999     WEND
```

When the program is RUN, line 10 will set the variable START to the value returned by TIME. The variable SECONDS is set to the required length and the program 'proper' is contained in lines 30 up to the WEND statement signalling the end of the sequence of operations. Try running some sort of program (even 30 PRINT ''TIME'') and you will see that it runs for exactly one minute.

Call direct

The same result can be obtained directly by using the Amstrad interrupt command, AFTER, which arranges to call a subroutine at a determined time in the future. Four timers may be used (0-3) and the syntax is as follows: AFTER time 1/50th seconds, timer number, GOSUB line number. The value for time must be an integer between 1 and 32767 allowing a range between 1/50th second and 11 minutes.

Program 1 will set each of the four timers to call each of the four subroutines at 15 second intervals. Line 50 is a neat way of performing a repetition loop whilst avoiding the use of GOTO. The variable, TIME, will always be greater than zero, so the operations between the WHILE and WEND statements will always be in an endless loop.

What you actually put into the subroutines is up to you. Even if subroutine 1000 takes longer than 15 seconds to run it will still be interrupted by timer 1. This is because

how it runs

Line	Effect
20,30	Set up the four text windows
40	Sets up graphic window
50-80	Set up window colours
90-130	Set up the strings and variables
140-180	Create six tone envelopes
190-220	Set up interrupts
230-330	Main program loops

Be careful when using interrupts and keyboard scanning, since the use of LINE INPUT or INPUT will disable all the interrupts. Use INKEY$ instead.
Interrupt 0 services the graphics window every 2/5ths of a second, interrupt 1 occurs every 3/5ths of a second and scrolls a message across the screen. Interrupt 2 occurs every 4/5ths of a second and prints the calculation on line 3010. Interrupt 3 services the sound routine which plays different notes. The three numbers after 'QUEUE' show the number of free spaces in each of the three channels.
The main program allows you to swap the windows over, print out all the ASCII character set and to flick the border colour through each of 27 shades.

program listings

Program 1 Main

```
10      AFTER 750,0 GOSUB 1000
20      AFTER 1500,1 GOSUB 2000
30      AFTER 2250,2 GOSUB 3000
40      AFTER 3000,3 GOSUB 4000
50      WHILE TIME > 0:PRINT "TESTING";:WEND
1000    PRINT : PRINT "THIS IS 15 SECONDS" : RETURN
2000    PRINT : PRINT "THIS IS 30 SECONDS" : RETURN
3000    PRINT : PRINT "THIS IS 45 SECONDS" : RETURN
4000    PRINT : PRINT "THIS IS 60 SECONDS" : RETURN
```

Program 2, first interrupt

```
10      EVERY 50 GOSUB 1000
100     WHILE TIME 0:PRINT TIME;:WEND
1000    SOUND 2,200,40:RETURN
```

Program 3, second interrupt

```
20      COLOR=0: EVERY 100,1 GOSUB 2000
2000    BORDER COLOR:COLOR=COLOR+1
2010    IF COLOR = 27 THEN COLOR=0
2020    RETURN
```

Program 4, third interrupt

```
30      EVERY 25,2 GOSUB 3000
3000    ORIGIN 0,0:DRAW 640,250:RETURN
```

Program 5, fourth interrupt

```
40      EVERY 40,3 GOSUB 4000
4000    ORIGIN 640,0:DRAW 1640,250:RETURN
```

there is a priority order for interrupts. In descending order of priority this is: ESC key, DI-EI, TIMER 3, TIMER 2, TIMER 1, TIMER 0. This subject will be covered in more detail later in this article.

Call repetition

It is more useful to be able to call a subroutine repeatedly and this is achieved by the use of the EVERY command. Program 2 uses this command to sound a note at one second intervals. In effect Program 2 is two programs running simultaneously, which is known as multi-tasking.

When using the SOUND command you must be careful to allow enough time for the sound to be played. In Program 2 the sound duration is 4/5ths of a second and as the subroutine is called only once a second, it has ample time in which to finish playing. Try setting the duration to 200 in the sound command. Once the four spaces in the sound queue are filled the computer will get 'hung up' at subroutine 1000. As explained in the article on Amstrad sound elsewhere in this issue, trying to put a sound into the queue when it is full will also put the computer into a wait state whether or not you are using interrupts.

If you now add a second interrupt (Program 3) it will cause the border colour to change every two seconds. Add Programs 4 and 5 to give five programs running simultaneously. The main program prints out the time in 300ths of a second, program 2 sounds a note every second (interrupt 0), program 3 changes the border colour (interrupt 1) and programs 4 and 5 draw diagonal lines on the screen (interrupts 2 and 3). The subroutines are very short and there is no problem performing the operations in one subroutine before the next interrupt is due.

If you were to amend the program thus:

```
10      EVERY 50,0
        GOSUB 1000
100     WHILE TIME > 0:
        PRINT
        "TESTING";:
        WEND
1000    FOR X=1 TO
        100: PRINT X;:
        NEXT: RETURN
```

and RUN it you will see that once the interrupt is called it overrides the main program loop at line 100. In other words, the

interrupt routine will 'gobble up' all the available time and the main program will not get serviced at all!

Add yet another interrupt and see what happens:

```
20    EVERY 50, 1
      GOSUB 2000
2000 PRINT "This is
      INTERRUPT 1":
      RETURN
```

This time interrupt 1, having priority over interrupt 0, will put a stop to interrupt 0 before it manages to print out 100 numbers. Note, however, that interrupt 0 will continue from where it left off after interrupt 1 finishes. In some instances it will not matter that a subroutine is interrupted but sometimes it might be vital to complete one subroutine before another is started.

In such a situation the commands DI (disable interrupts) and EI (enable interrupts) can be used. If you change line 1000 in the program to:

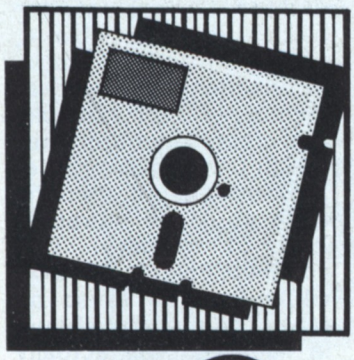
```
1000 DI:FOR X=1 TO
      100: PRINT X;:
      NEXT:EI:RETURN
```

all of the 100 numbers will be printed out before being interrupted by interrupt 1. Nothing can override it, except of course the ESC key which has the highest priority of all.

Finally I have included a program which demonstrates the use of the four interrupts to drive the four different programs using Amstrad's windowing system and the sound queueing facility. This is explained fully in the section entitled 'How it runs'.

demonstration program

```
10 MODE 1
20 WINDOW £0,2,20,2,10:WINDOW £1,2,39,14,14
30 WINDOW £2,2,14,17,24:WINDOW £3,18,39,17,24
40 ORIGIN 350,240,350,620,380,240
50 INK 0,1:INK 1,6:INK 2,12:INK 3,22
60 PAPER £0,2:PAPER £1,3:PAPER £2,3:PAPER £3,2
70 PEN £0,1:PEN £1,0:PEN £2,0:PEN £3,1
80 CLS £0:CLS £1:CLS £2:CLS £3:CLG 1
90 display$="..... W I N D O W   £ 1....."
100 LOCATE £3, 2,2:PRINT £3,"Q U E U E  = ";
110 LOCATE £3,2,4:PRINT £3,"ENVELOPE   = ";
120 LOCATE £3,2,6:PRINT £3,"DURATION   = ";
130 color=1:y=0:shade=14:size=37:count=1:envelope=1
140 ENT -1,5,1,1,10,-1,1,5,1,1
150 ENT -2,10,2,3,17,-2,2,7,2,4
160 ENT -3,10,-2,2:ENT -4,10,-2,2
170 ENT -5,10,2,2,5,-4,1,20,1,4,5,-4,3
180 ENT -6,70,1,1,140,-1,1,70,1,1
190 EVERY 20,0 GOSUB 1000
200 EVERY 30,1 GOSUB 2000
210 EVERY 40,2 GOSUB 3000
220 EVERY 50,3 GOSUB 4000
230 LOCATE 5,1:PRINT"WINDOW £0"
240 LOCATE 6,3:PEN 1:PRINT"M E N U"
250 LOCATE 1,5:PEN 3:PRINT" 1 - Swap Windows "
260 LOCATE 1,6:PRINT" 2 - Change Border"
270 LOCATE 1,7:PRINT" 3 - Display ASCII "
280 LOCATE 2,9:PEN 3:PRINT"PRESS 1, 2 or 3"
290 a$=INKEY$:IF a$="1" THEN WINDOW SWAP 1,2:WINDOW SWAP 0,3
:GOTO 80
300 IF a$="2" THEN BORDER shade
310 shade= -shade*(shade<>25)+1
320 IF a$="3" THEN GOSUB 5000
330 IF flag=1 THEN flag=0:CLS £0:GOTO 230 ELSE 290
1000 REM This is the GRAPHIC WINDOW
1010 DI: ORIGIN 350,240:DRAW 640,y,color
1030 color= -color*(color<>3)+1
1040 y=y+5:IF y=1500 THEN CLG 1:y=0
1050 EI:RETURN
2000 REM This is WINDOW £1
2010 DI:MOVEIT$=RIGHT$(display$,size)+LEFT$(display$,37-size
)
2020 PRINT £1,MOVEIT$;:size=size-1
2030 IF size=0 THEN size=37
2040 EI:RETURN
3000 REM This is WINDOW £2
3010 PRINT £2,count;:count=(-count*(count<1E+09)*1.10332)+1
3020 RETURN
4000 REM This is the SOUND routine
4010 DI:free1=SQ(1) AND 7 :free2=SQ(2) AND 7:free3=SQ(4) AND
 7
4020 IF free1 <>0 THEN READ channel,note,duration ELSE 4110
4030 LOCATE £3,14,2:PRINT £3,free1;free2;free3
4040 LOCATE £3,14,4:PRINT £3,envelope
4050 LOCATE £3,14,6:PRINT £3,duration;"  "
4060 IF channel= -1 THEN RESTORE:GOTO 4110
4070 envelope= -envelope*(envelope<>6)+1
4080 SOUND channel,note,duration,,,envelope
4090 DATA 1,200,200,4,300,200,7,700,80,1,178,50
4100 DATA 2,40,250,4,178,50,7,400,500,-1,-1,-1
4110 EI:RETURN
5000 REM Display ASCII characters
5010 flag=1:FOR character = 32 TO 255
5020 PEN £0,0: PRINT £0, CHR$(character);
5030 NEXT character
5040 PEN £0,3:PRINT:PRINT £0,"Press <ANY KEY>";
5050 WHILE k$="":k$=INKEY$:WEND
5060 k$="":RETURN
```



ORIC/ATMOS

Squash

The theory of 'squashing' data for the hi-res screen has been explained on page 12. David Ellis has done all the hard graft for Oric and Atmos owners by presenting them with this program.

You've read the theory of screen compression elsewhere in this issue, now here is the actual program for the Oric/Atmos.

As you can see from the machine code loader program the numbers are held in data statements and are divided into the CODING ROUTINE, which reduces the hi-res screen contents to the compressed code, and the DECODING ROUTINE, which decodes the compressed code and reproduces the original hi-res screen picture.

The BASIC program which enters the machine code numbers may be of interest in itself. The first data line must contain the start address of where the machine code is to be stored in memory. This is followed by the width of each block of numbers. I have chosen 8 for the width which will make it easier for you to read and type in. Any width can be chosen from 2 up to the maximum of 80 but numbers must be entered in hexadecimal (2 digits). When developing a machine code program I advise you to start with a width of 2, and numbers can be entered separated by commas in the usual way. This will permit the easy insertion and deletion of numbers.

When your code is fully debugged you can set the width to whatever you require; 16 or 32 are good numbers as it is then easy to calculate the address of a byte in the data list by just counting the number of blocks. Although this is not the quickest way of POKEing numbers to memory it is certainly the neatest, the easiest to check and the easiest to type in. Note that all numbers must be in hexadecimal and must consist of two digits — numbers below 10 (16 decimal) must therefore be pre-fixed by a zero.

The checksum (CSUM) is the total of all the machine code numbers added together. The variable T holds the total. You can set this to 0 at first and when your machine code numbers are correct replace the 0 by the value held in T. This is also a useful check to see that the data has been correctly loaded from tape. In this case it will check to see that you have entered all the numbers correctly. If you do get the "DATA ERROR" message then check through the numbers carefully. It may help you to know that the checksum for the coding routine numbers is 37245. If you get a "DATA ERROR" then change the CSUM to 37245 and add line:
425 DATA END

If you still get the "DATA ERROR" message then the error is in the first part of the code. Check the first part until you get no error message, delete line 425, and change the CSUM back to 58402. Any error messages now will show that the error is in the latter part of the machine code. Assuming that you have entered the data correctly then run the program. It will take

around ten seconds to load the machine code numbers to memory. You can now type NEW as the BASIC program has now completed its task. The two machine code routines are now stored at the following addresses:
#95D0 (38352) CODING ROUTINE
#9738 (38712) DECODING ROUTINE

To test the coding part of the program first get into the hi-res mode by typing HIRES. Now type CALL#95D0. A row of dotted lines should appear at the top of the screen. These are the 'markers' that are used by the program and will always appear when any columns are the same. This will take around two seconds before returning to BASIC and the 'READY'.

If you return to the TEXT mode (assuming everything works OK) you can now take a look at the code that was produced by typing:
FOR X=30000 TO DEEK(8):PRINT PEEK(X);:NEXT

The following numbers should then be printed out: 51 200 64 52 followed by 50 32 (thirty nine times) and finally 53. These should be easy to fathom out. A blank hi-res screen consists of 8000 64's.

The first column on the screen (column 0) is represented by:

51 — repeat
200 — 200 times
64 — the number 64
52 — end of the line

The thirty nine 50 32's are:

50 — the same as
32 — column 32

The column should actually be number 0, but 32 is added to the column number to avoid using screen synchronisation numbers (24-31). The decoding part of the program will take this into account by subtracting 32 from the number following a 50 marker, thus giving the correct column number. There are 40 columns on the ORIC so naturally for the blank screen, columns 1 to 39 will all be the same as column 0, hence the 39 of 50 32's. In this instance the 8000 bytes have been reduced to 83.

Saving a blank screen is not much use though — or is it? Return to the hi-res mode again and draw something on the screen — anything will do, lines, circles, whatever you wish. Now type CALL#9738 and the decoding routine will take the 83 bytes of code that we have just studied and display the decoded information back to the hi-res screen. In other words it will draw a blank screen. You now have access to a HIRES CLS! However, the program was designed to be of more use than this.

Try drawing some lines, circles etc again and then code the picture by typing CALL#95D0. Now type HIRES to reset and clear the screen. If you type CALL#9738 your original picture should be decoded and displayed back onto the screen in well under a second.

Program addresses

As has been seen #95D0 and #9738 call the coding and decoding routines respectively. In normal circumstances the condensed code is stored at memory location #7500 (30000) onwards. The length of the condensed code can be calculated by subtracting 30000 from DEEK(8), which holds the address of the last memory location of the condensed code. To save the code to tape (or disk) enter CSAVE"xxx",A30000,E DEEK(8) where xxx is the filename that you give to your picture. The block of condensed code will then be stored to tape. When loading the block back to memory from the tape it is only necessary to enter CLOAD"xxx".

The start (A) and end (E) addresses are not needed as these are already stored on the tape. One 'bug' on the Oric-1 is that if a block of data is loaded into memory from tape, the 'top of BASIC' pointer is incorrectly set to the E address. Poor Oric will now think that it has a massive BASIC program in memory which can produce some very strange results. The solution is fortunately easy. Before loading in the block of code take a DEEK at location 156 and make a note of the number returned. After the block of code has been loaded into the computer, DOKE 156 with the number that you jotted down. This should reset the pointer, and the Oric back to normal!

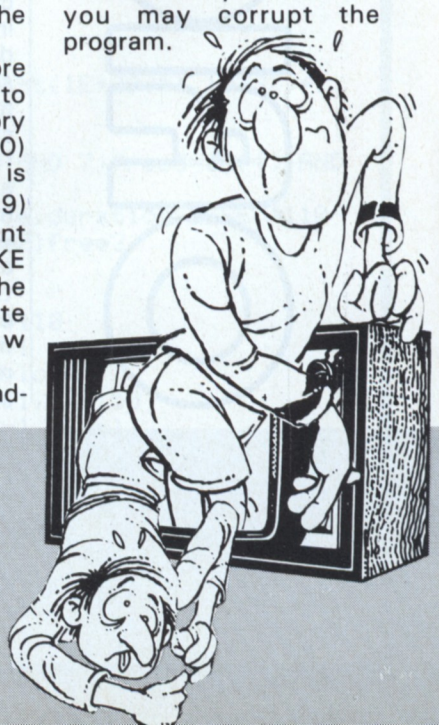
If you wish to store the condensed code to another part of memory (instead of at #7500) then all you need to do is to POKE#9645 (38469) with the least significant byte (LSB), and POKE #9649 (38473) with the most significant byte (MSB) of the new address.

By changing the addresses for each screen picture it is possible to store consecutive blocks of condensed code to memory. If, for example, you created eight pictures which used an average of 2.5K per picture, then the code could be stored in 20K of memory. This complete block of 20K could then be saved on tape. The program shown in listing 2 will actually 'flick' through each of the 8 pages each time that you press a key. The start of the code for each picture is given in the data statements. Line 90 resets the store address to the normal #7500. The addresses shown in the demo program are only an example — yours will obviously be different!

For machine code programmers the following Zero Page locations should not be used as they contain various addresses and flags which are used by the two machine code routines.

CODING Zero Page 0 to 9
DECODING Zero Page 0 to 7

Do *not* use the marker numbers 50, 51, 52 and 53 on the hi-res screen. The only way that these numbers will get onto the screen is if you POKE them in. If you do then you may corrupt the program.



hints on conversion

The best hint I can give you is to 'forget it'. If you have a 6502 based computer and you are a competent machine code programmer then you may be able to disassemble the code and use some of the routines. Your best bet though is to read the Screen Compression article in this issue, develop a BASIC program that works (albeit slowly) and then reduce parts of the BASIC program to machine code.

HOW TO USE THE PROGRAM

1. Enter the machine code loader program and SAVE it before running it.
2. With the m.c. loader in memory, write or load your own hi-res screen generating program.
3. To compact data use the coding and decoding calls given in the text.
4. Enter the BASIC demo program or your own BASIC program which uses the m.c. generated by loader program.

program listing

BASIC demo program

```
0 REM*****************************
1 REM* TO CHANGE ADDRESS (CODING)  *
2 REM* POKE #9645,LSB. #9649,MSB   *
3 REM* TO CHANGE ADDRESS (DECODING)*
4 REM* POKE #9739,LSB. #973D,MSB   *
5 REM*****************************
10 HIRES
20 FOR X=1 TO 8:READ A$
30 MSB=VAL("#"+LEFT$(A$,2))
40 LSB=VAL("#"+RIGHT$(A$,2))
50 POKE #973D,MSB:POKE #9739,LSB
60 PRINT"PRESS ANY KEY FOR PICTURE"
70 GET K$:CLS:CALL #9738
80 NEXT X
90 POKE 38717,117:POKE 38713,48
100 DATA 2A38,3255,3A3E,3FED
110 DATA 4735,54C9,59F9,6DF0
```

program listing

Machine code loader program

```
10 READ MEMRY,WIDTH,CSUM:T=0
20 REPEAT
30 READ CODE$
40 FOR NUMBER = 1 TO WIDTH STEP 2
50 V=VAL("#"+MID$(CODE$,NUMBER,2))
60 POKE MEMRY,V:MEMRY=MEMRY+1:T=T+V
70 NEXT NUMBER
80 UNTIL CODE$ = "END"
90 IF T<>CSUM THEN PRINT "DATA ERROR"
100 DATA 38352,8,58402
110 REM ***************************
120 REM ****  CODING ROUTINES   ****
130 DATA A9008505,8507A9A0,8506A901
140 DATA 8508A408,B105C932,F040A407
150 DATA B105C932,F037A900,8500A9A0
160 DATA 85028504,A5078501,A5088503
170 DATA 20A896A5,00C900F0,12A408A9
180 DATA 32910518,A5086928,A8A50769
190 DATA 209105A5,08C927F0,05E60818
200 DATA 90C8A507,C926F00A,E607A507
210 DATA 8508E608,90A8A027,A9349940
220 DATA BF8810FA,A9008507,A9308508
230 DATA A9758509,A407B105,C932F022
240 DATA A9008500,A5078501,A9A08502
250 DATA A5088503,A5098504,20D596A5
260 DATA 038508A5,04850918,900FA407
270 DATA 209496A4,07189869,28A82094
280 DATA 96E607A5,07C928D0,BFA935A0
290 DATA 00910860,B105A000,9108E608
300 DATA D002E609,60EAEAEA,EAEAEAEA
310 DATA A000A200,A101C103,D022C8C0
320 DATA C8F01918,A9286501,85019002
330 DATA E60218A9,28650385,039002E6
340 DATA 041890DC,A9018500,60A200A9
350 DATA 008500A0,01A10148,A9281865
360 DATA 019002E6,028501A1,01C934D0
370 DATA 04A90185,0068C101,D003C8D0
380 DATA E2C001F0,2118C004,901248A9
390 DATA 33810320,F2979881,0320F297
400 DATA 6818900A,810320F2,9788D0F8
410 DATA F0058103,20F297A9,00C500F0
420 DATA AAA10181,0320F297,60EAEAEA
430 REM***************************
440 REM***** DECODING ROUTINE *****
450 DATA A9308500,A9758501,A9008502
460 DATA 85048506,A9A08503,85058507
470 DATA A000B100,20EB97C9,32F010C9
480 DATA 33F012C9,34F01491,02207D97
490 DATA 1890E720,89971890,E120B997
500 DATA 1890DB20,D5971890,D518A928
510 DATA 65028502,9002E603,60B10038
520 DATA E9201865,068506A2,C8B10691
530 DATA 02207D97,18A92865,06850690
540 DATA 02E607CA,D0EBA900,8506A9A0
550 DATA 850720EB,9720CF97,60B10020
560 DATA EB97AAB1,00910248,207D9768
570 DATA CAD0F620,EB9760B1,00C935F0
580 DATA 11E604A5,048502A5,058503A5
590 DATA 04C928F0,03606868,686860E6
600 DATA 00D002E6,0160E603,D002E604
610 DATA 60EAEAEA,END
```

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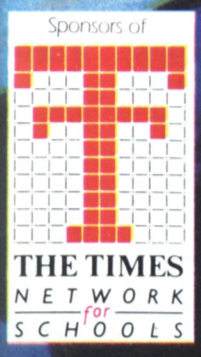

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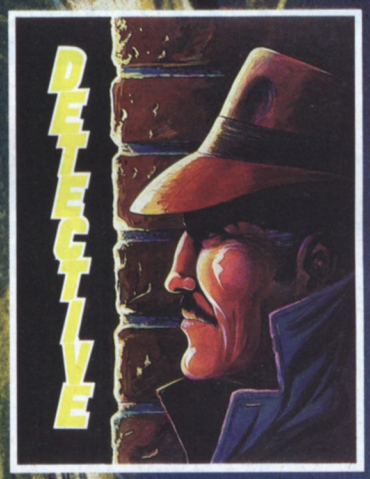

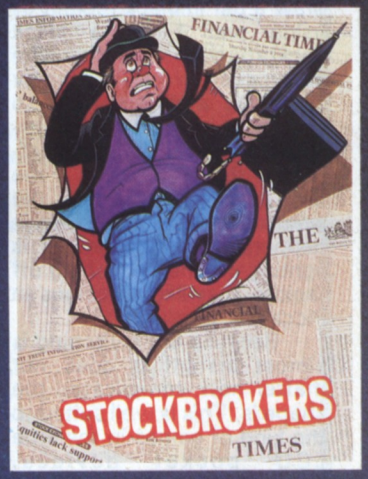

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Graphics

One of the best features of the CPC464 is its impressive graphics. Easy to use too, as Simon Rockman demonstrates with some stunning programs.

In the recent past computers did not have very impressive graphics. Now computers like the BBC micro and the Amstrad CPC 464 have changed all that.

The CPC 464 is particularly powerful in that it has 27 colours. Because it can only display 16 of these at once there is a process known as paletting which allows you to select your colour or 'INK'. Table 1 shows the possible colours.

The keywords on the CPC 464 are very well chosen to make it easy to understand the process of putting each ink into a pen. When you change pens you get a new colour to write with; however there are two slight flaws in the process. The first is that the background has an ink colour, so INK 0,13 would set the background, pen 0, to grey. This takes a bit of getting used to but it is not so difficult to deal with.

What is slightly more confusing is that changing the ink in the pen re-colours all the existing stuff drawn with that pen. This has some great advantages. If you draw a bar in black (colour 0) using pen 1 on a black background (pen 0), then you can make the bar appear by allocating a different ink to pen 1.

Program 1 shows the effect of this. It looks as if the bar is moving across the screen. However, all that is happening is that the bar is lighting up and switching off rapidly, just like the signs in Piccadilly Circus.

Because the switching is almost instant it does not matter how complicated the shape is. This is well suited to the kind of games in the little LCD pocket devices. However, since there are only 16 colours available for this switching process the number of objects you can have is limited.

Flashing colours can be used in a similar way and because they will keep flashing regardless of what the rest of the computer is doing, it is possible to create the effect of movement. By altering the rate of flash an illusion of acceleration and deceleration can be achieved. Program 2 shows a stationary road, the flashing colours give the impression that you are riding down it.

In the world of supercomputers, graphics are getting so complicated and the resolution so high that they rival artwork for quality. Most of the programmers and designers who drive these machines started life as artists and not as computer people, however one thing they all agree on is that you have to learn the associated maths.

The only time I ever took any interest in maths at school was when I knew that listening in class meant that I could go home and draw a pretty (if lo-res) picture on my computer. The result was that I learnt how to draw circles. Program 3 shows a neat way of doing this and Program 4 some improvisations on the theme.

Flat graphics are all very well but the fun starts when a third dimension is added. Program 5 shows a CPC 464 version of a hump which appeared in the August 1984 issue of PCT for the Commodore 64. If you play around with the values for elevation and angle you can look around most of the figure.

Unfortunately the CPC 464 is not capable of drawing a new figure 20 times each second or it would be possible for you to "fly" over and around the figure. This is something best left to the simulators which cost millions of pounds.

It would be nice to combine the speed of changing inks with the complexity of a three dimensional figure. This is what the final program does. It produces a tilted beach ball which rotates. Use the 'Z' key to make it go faster and the 'X' to slow it down. Play about with all these programs and see what you can produce. Maths is much more fun when you see it in action.

program listing 1

```
10 REM program 1 - moving bars
20 MODE 0
30 FOR a=1 TO 15
40 FOR b=1 TO 40 STEP 4
50 MOVE a*40+b,100
60 DRAW a*40+b,140,a
70 NEXT
80 NEXT
90 FOR c=0 TO 15
100 INK c,13
110 NEXT
120 FOR c=1 TO 15
130 INK c,26:INK c-1,13
140 IF c=1 THEN INK 15,13
150 FOR delay=1 TO 20:NEXT
160 NEXT
170 GOTO 120
5 REM program 3 - a circle
10 INPUT "X co-ordinate of circle";x
20 INPUT "Y co-ordinate of circle";y
30 INPUT "Radius  of circle";r
40 GOSUB 500
50 GOTO 10
499 REM routine to draw a circle
500 MOVE x+r*SIN(PI),y+r*COS(PI)
510 FOR angle=PI TO 3*PI STEP 0.2
520 DRAW x+r*SIN(angle),y+r*COS(angle)
530 NEXT angle
540 RETURN
```

Program 1 Demonstration of colour switching

program listing 2

```
5 REM program 2 - a roadway
10 REM *************** Set up Inks *****
20 INK 1,18
30 INK 0,11
40 INK 2,13
50 INK 3,6,26 :REM ink for kerb
60 INK 4,26,6 :REM ink for kerb
70 INK 5,26,13:REM ink for cemtre line
80 INK 6,13,26:REM ink for cemtre line
90 MODE 0: REM we will need 16 colours
100 MOVE 0,0
110 REM *** draw left hand grass
120 FOR x=0 TO 320
130 DRAW x,320,1
140 MOVE x,x
150 NEXT
160 REM *** draw road as two triangles
170 FOR x=0 TO 320
180 MOVE x,0
190 DRAW x,x,2
200 NEXT
210 FOR x=320 TO 640
220 MOVE x,0
230 DRAW x,640-x,2
240 NEXT
250 REM *** draw right hand grass
260 FOR x=320 TO 640
270 MOVE x,320
280 DRAW x,640-x,1
290 NEXT
300 REM draw kerbs; ct controls length of stripe
310 FOR x=0 TO 320
320 ct=ct+1:IF ct=20 THEN c=1-c:ct=0
330 MOVE x,x
340 DRAW x,x+(320-x)/10,c+3
350 NEXT
360 FOR x=0 TO 320
370 ct=ct+1:IF ct=20 THEN c=1-c:ct=0
380 MOVE x+320,320-x
390 DRAW x+320,320-(x*1.1),c+3
400 NEXT
410 'draw centre stripe.
420 FOR x=0 TO 320
430 ct=ct+1:IF ct=40 THEN c=1-c:ct=0
440 MOVE 320-x/40,320-x
450 DRAW 320+x/40,320-x,c+5
460 NEXT
```

Program 2 Demonstration of 'movement'

program listing 3

```
5 REM program 3 - circle
10 INPUT "X Co-ordinate of circle";x
20 INPUT "Y Co-ordinate of circle";y
30 INPUT "radius of circle";r
40 GOSUB 500
50 GOTO 10
500 MOVE x+r*SIN(PI),y+r*COS(PI)
510 FOR angle=PI TO 3*PI STEP 0.2
520 DRAW x+r*SIN(angle),y+r*COS(angle),1
530 NEXT angle
540 RETURN
```

Program 3 Demonstration of circle drawing

program listing 4

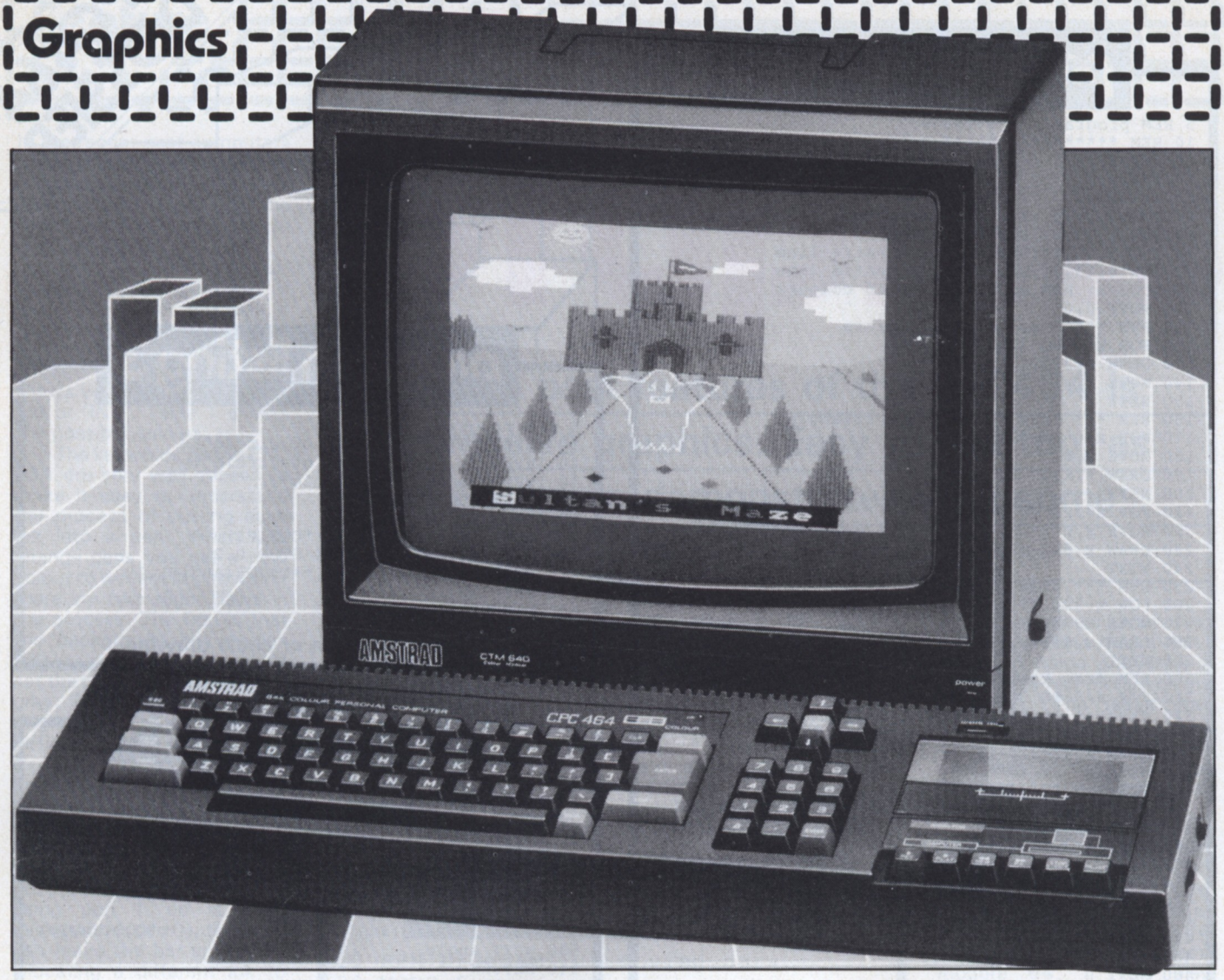
```
5 REM program 4 - a figure of eight
10 INPUT "X co-ordinate of figure";x
20 INPUT "Y co-ordinate of figure";y
30 INPUT "Radius  of figure";r
40 GOSUB 500
50 GOTO 10
500 MOVE x+r*SIN(PI)*COS(PI),y+r*COS(PI)
510 FOR angle=PI TO 3*PI STEP 0.2
520 DRAW x+r*SIN(angle)*COS(angle),y+r*COS(angle)
530 NEXT angle
540 RETURN
```

Program 4 Further improvisation

program listing 5

```
10 REM program 5
20 REM humps by Grahame, Owen and Simon
30 INK 0,13:INK 1,0:INK 2,1:INK 3,2
40 p=1:PRINT"suggested values in brackets"
50 INPUT"step (10)";se
60 INPUT"line spacing (10)";ls
70 INPUT"elevation angle (0.55)";el
80 INPUT"side angle (70)";sa
90 INPUT"perspective (5)";pe
100 INPUT"scale (2)";sc
110 INPUT"1 hump or 2";hu
120 MODE 1
130 DIM l(1),h(501),l1(1),h1(501):a=el
140 vy=-SIN(a):vz=COS(a)
150 FOR i=0 TO 7:a(i)=2^i:NEXT
160 GOTO 240
170 REM
180 ON hu GOTO 190,210
190 r=SQR(x*x+y*y):IF r<>0 THEN z=SIN(r/10)*1000/r
200 RETURN
210 r=SQR((x+70)*(x+70)+y*y):IF r<>0 THEN z=SIN(r/10)*1
000/r
220 RETURN
230 r=SQR((x-70)*(x-70)+y*y):IF r<>0 THEN z=z-SIN(r/10)
*1000/r
240 FOR i=0 TO 500/se+1:h(i)=0:h1(i)=0:NEXT
250 PEN p:p=p+1:IF p=4 THEN p=1
260 FOR y=200 TO -200 STEP -ls:m$="M"
270 FOR x=-120 TO 120 STEP se
280 GOSUB 180:GOSUB 530
290 IF v>h(h)THEN GOSUB 480:h1(h)=v:M$="D":GOTO 320
300 REM
310 M$="M"
320 NEXT:FOR i=0 TO 500/se+1:h(i)=h1(i):NEXT:NEXT
330 FOR i=0 TO 500/se+1:h(i)=0:h1(i)=0:NEXT
340 FOR x=120 TO -120 STEP -ls:m$="M"
350 FOR y=200 TO -200 STEP -se
360 GOSUB 170:GOSUB 530
370 IF v>h(h)THEN GOSUB 480:l1=(h)=v:m$="D":GOTO 390
380 m$="M"
390 NEXT:FOR i=0 TO 500/se+1:h(i)=h1(i):NEXT:NEXT
400 x=120:y=-200:GOSUB 170
410 GOSUB 530:m$="M":GOSUB 480:z=z-50:GOSUB 530:m$="D":
GOSUB 480
420 x=120:y=200:GOSUB 170
430 z=z-50:GOSUB 530:GOSUB 480:z=z+50:GOSUB 530:GOSUB 4
80
440 z=z-50:GOSUB 530:m$="M":GOSUB 480
450 x=-120:y=200:GOSUB 170
460 z=z-50:GOSUB 530:m$="D":GOSUB 480:z=z+50:GOSUB 530:
GOSUB 480
470 GOTO 470
480 REM plotit
490 x%=2*u*sc:y%=2*(v*sc/1.6)
500 IF m$="M" THEN MOVE x%,y%:GOTO 520
510 DRAW x%,y%,p
520 RETURN
530 u=64+x/2:v=80+(vy*y+vz*z)/2
540 c=(200-y)/400:u=(u+c*sa)*(pe-c)/pe:v=v*(pe-c)/pe
550 h=INT(u/se*2):RETURN
```

Program 5 Drawing a 'hump'



program listing 6

```
10 REM program 6 - spinning beach ball
20 INK 0,0
30 FOR x=1 TO 15:INK x,x+10:NEXT
40 MODE 0
50 c=1:INK 1,11:INK 2,12:INK 3,13
60 pai=3.14159:g=0:r=240
70 FOR p=0 TO pai STEP pai/31
80 g=0
90 c=c+0.5:IF c>15 THEN c=0.5
100 FOR th=0 TO pai*2 STEP pai/32
110 x=r*SIN(th)*COS(p)
120 y=r*COS(th)
130 z=r*SIN(th)*SIN(p)
140 GOSUB 400
150 IF z3<0 THEN g=0: GOTO 170
160 GOSUB 450
170 NEXT th
180 NEXT p :sp=100
190 FOR x=1 TO 14:cc=((x+i) MOD 15)+1
200 INK cc,x+1
210 NEXT
220 INK cc,1
230 FOR dl=1 TO sp
240 a$=INKEY$:IF a$="z" THEN sp=sp-10
250 IF a$="x" THEN sp=sp+10
260 NEXT:i=i+1:GOTO 190
270 c=0
280 FOR q=0 TO pai STEP pai/31
290 g=0
300 FOR th=0 TO 2*pai STEP pai/16
310 x=r*SIN(th)*SIN(q)
320 y=r*COS(q)
330 z=r*COS(th)*SIN(q)
340 GOSUB 400
350 IF z3<0 THEN g=0:GOTO 370
360 GOSUB 450
370 NEXT th
380 NEXT q
390 END
400 y3=y*0.877583-z*0.479425
410 z1=y*0.479425+z*0.877583
420 x3=x*0.825336-z1*0.564642
430 z3=x*0.564642+z1*0.825336
440 RETURN
450 gx=240+x3:gy=-240+y3
460 gy=ABS(gy)/1.4:gx=gx/1.4
470 IF g=1 THEN 490
480 MOVE gx,gy
490 DRAW  gx,gy,c
500 g=1
510 RETURN
```

Program 6 Rotating tilting beach ball

Ink Number	Colour/Ink
0	Black
1	Blue
2	Bright Blue
3	Red
4	Magenta
5	Mauve
6	Bright Red
7	Purple
8	Bright Magenta
9	Green
10	Cyan
11	Sky Blue
12	Yellow
13	White
14	Pastel Blue
15	Orange
16	Pink
17	Pastel Magenta
18	Bright Green
19	Sea Green
20	Bright Cyan
21	Lime Green
22	Pastel Green
23	Pastel Cyan
24	Bright Yellow
25	Pastel Yellow
26	Bright White

Table 1 Master Colour Chart: INK numbers and colours.

The reasons single people join Dateline are often very varied, but come down to one thing — they are simply not meeting the sort of people they would like to meet.

'We are going to get on!'

Tim Stagg, a 31-year old engineer from Pangbourne, found that the break-up of his marriage two years previously and the ending of another relationship since, had left his confidence rather dented. 'So I thought I'd try Dateline because at least that gives you a starting point for meeting people.'

At first Tim could not bring himself to actually telephone any of the girls whose names he received through Dateline; instead he made the initial approach by letter. He was delighted when girls started to telephone him, after receiving his name on their lists. For Tim it made the whole thing a lot easier, and a series of pleasant dates soon saw the return of his confidence. Fortunately, because on his third list from Dateline appeared the name of Christine Terry.

Tim and Chris agreed to meet at a point halfway between his home and Basingstoke, where Chris worked as a student midwife. Having just moved to Basingstoke, and working unsocial hours, Chris found it very difficult to meet people. 'Many of my colleagues were married and I was getting very low,' said Chris, an articulate 29-year old. 'I saw Dateline advertised and decided to give it a try.'

Chris had only been a member of Dateline for two weeks when Tim contacted her. Nevertheless, she managed to meet four people before that! But she was immediately taken with Tim when he phoned and was delighted when he suggested that they meet.

They agreed to meet in the car park of a pub and swopped car registration numbers as a means of identifying each other. Chris liked Tim immediately. 'Even seeing him sitting in his car, I thought 'We're going to get on!' Mind you, I thought that when he phoned up first of all. He was quite cheeky on the phone and I liked that.'

Tim was also very taken with Chris and their first evening was extremely successful. 'The time just flew by. It seemed we had only just met and then it was time to go again. I can't even remember what we talked about!'

They decided to meet again a week later ('or sooner if you prefer,' Tim had said, hopefully), and Chris went home to her parents for the weekend. She returned to Basingstoke rather earlier than anticipated on the Sunday and felt like seeing Tim again, so she phoned him and they met again at 'their' pub that evening. They've met nearly every night since!

Within two or three weeks, Chris realised that she was falling in love with Tim and they were beginning to talk about the possibility of a future together. 'We went to London for a few days,' remembered Chris, 'and Tim said, 'Why don't we go to Hatton Garden and get a ring?!' So we did! It was a lovely day.'

Within three months of meeting each other, Chris and Tim were engaged and are planning a wedding in a year's time when Chris has qualified. Their families are very happy for them and Tim has found his friends very supportive. 'I thought they would laugh at me joining Dateline, but they didn't,' he said. 'After a while, especially after I met Chris, it made such a tremendous difference to me — I was so much happier. I would definitely advise anyone to join Dateline. I enjoyed nearly all my dates and even at worst had a pleasant evening out each time. Dateline helped me get my confidence back and I enjoyed my membership.'

Even though Chris was a member for such a short time she met quite a few people before finding Tim. 'Even just getting correspondence and phone calls was nice,' she said. And what advice would she give people who join Dateline?

'Give it time and you do meet the right people,' she said, smiling at Tim.

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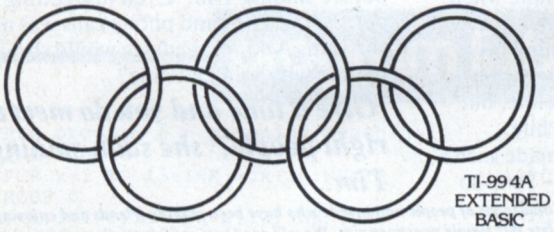

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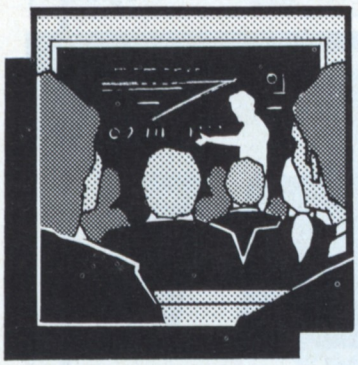


VIC20 basics

BASIC is easy to learn (as you have found out!) but is too limiting in terms of speed for it to be of any use when writing games. The solution is machine code and in this article Bob Wallace begins his tutelage of the subject.

In my recent articles we have stayed on the straight and narrow path of Commodore BASIC. There is no denying that BASIC as a language is very easy to learn, and in next to no time you can produce some very pleasing results.

Having said that, BASIC has its limitations, the greatest of which is its speed of execution. Any line of a BASIC program is of little use to the machine as it stands. Before the line is RUN, a machine code routine in the computer's ROM scans the line and interprets each command before sending the relevant information to another machine code routine for execution.

It is because of this interpretation procedure that BASIC is so slow. Every line, even though it may be used several times throughout the program has to be interpreted each time it is encountered. Thus, even the use of GOSUBs does not really help in speeding up your programs.

Fast solution

If you wish to write fast action games, the only real solution is to write them entirely in machine code or to use machine code routines called from within your BASIC program. Now this may sound a very daunting task if you have never used machine code before. If you wish to experiment with it, you will need some sort of ASSEMBLER/DISASSEMBLER to enter your machine code. These are available at various prices from your micro stockist.

Commanding code

Now where do we start with our machine code? Probably the nearest command in BASIC to a machine code command is the POKE command. Using this, you can place any number from 0 to 255 into a memory location. Try this for size in direct mode:

```
POKE 36879,8:POKE
7680,42
```

You should now have a black screen with a white '*' in the top left hand corner. The machine code translation of this would be:

```
KDA #$08
STA $900F
LDA #$2A
STA $1E00
```

You've probably noticed that some of the numbers look slightly odd to say the least. The reason for this is that when you write in machine code a different number base is used. The normal base used is BASE 16 otherwise known as HEXADECIMAL. This may all seem very confusing, but as you will see, it is very easy to convert from base 10 to base 16.

If we start by looking at decimal numbers, you will see that any number, no matter how large, only contains digits in the range 0 to 9 (0 to base number −1). The base 10 number 90775 only contains digits in the range 0 to 9. In hexadecimal we would have the range 0 to 15 (0 to base number −1). This seems to create a problem, because how do you express 10 as a single digit?

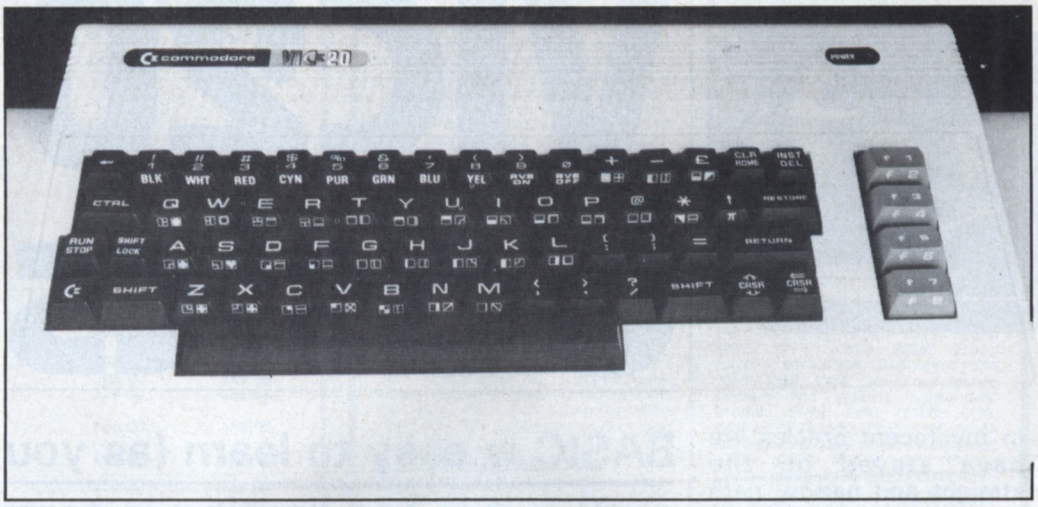
The answer is simple, you give it a letter, namely the letter 'A'. Thus, the numbers 0 to 16 (base 10) become:
0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F,10 (base 16)

If all this seems like to much trouble, then try programs 1 and 2, one in BASIC the other in machine code and see which you prefer. They

```
5 TI$="000000"
10 PRINT"[illegible]";:FORX=0TO254:PRINT"*";:NEXT
15 T=TI/60
20 PRINT:PRINT:PRINT:PRINT"IT TOOK ";T;"SECONDS TO DO THAT"
```

Program 1

are programs to print 255 '*' to the screen, very simple but they demonstrate the differences. After running them you should see that the second is by far the fastest of the two. How did the machine code get there without an assembler? We used the POKE command to POKE in the data containing the machine code in the second program. Are you convinced of the merits of machine code? If so, see you next month for a more useful routine.




```
10 LOC=828:FORX=0TO17:READBYTE:POKELOC,BYTE:LOC=LOC+1:NEXT:TI$="000000"
20 SYS828
30 T=TI/60
40 PRINT:PRINT:PRINT:PRINT"IT TOOK ";T;"SECONDS TO DO THAT"
45 END
50 DATA169,147,32,210,255,169,42
60 DATA162,0,32,210,255,232,224
70 DATA255,208,248,96
```

Program 2

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Sound

The CPC464's sound facilities are second to none but slightly complex. Investigate them with David Ellis.

Like many other home computers the CPC464 uses the familiar AY8910 chip to produce its sound and the BASIC has been designed to make full use of the facilities of this chip. Unfortunately this means that the sound commands are fairly complex and considerable study will be required to master all these facilities.

Stereo sound

Firstly the sound is in stereo, or at least it is if connected up to your hi-fi via the stereo jack plug socket on the rear of the machine. Although the sound output from the in-built speaker is quite reasonable and has its own volume control, you really are missing out if you do not connect it up to your hi-fi.

The SOUND command is used to generate all sounds and noises. The first parameter of SOUND is the 'channel status' and this must be a value between 1 and 255. The bit pattern selects which of the three channels is played, together with other facilities which will be discussed later. The low order three bits select the channel as shown in Figure 1 over the page.

To send the sound to channel A (right speaker) the channel status number would be 1. A value of 4 would send the sound to channel C (left speaker). A value of 2 sends the sound output to channel B and splits it equally between the right and left speakers, giving a centre stereo image. Selecting channels A and B (value 1 + 2 = 3) gives a stereo image between the right and centre, and likewise channels B and C (value 4 + 21 = 6) give a left/centre stereo image. Sound 'movement' can therefore be simulated, although I shall not be looking further into this aspect as there is so much ground to cover on the other facilities available.

The second parameter of the SOUND command is the TIME PERIOD which must have a value between 1 (high pitch) and 4095 (low pitch). A value of 0 is used where only a 'noise' is required. The range of pitch can be demonstrated by:

```
FOR PITCH = 1 TO 4095
: SOUND 2, PITCH :NEXT
```

As no duration time has been specified, the length of each note will be set to the default rate of 1/5th second. The next parameter of SOUND is the DURATION of the note. Values between 1 and 32767 give the time in 1/100ths of a second, giving a length of note from 1/100ths of a second to over 5 minutes. Simple tunes can be constructed by using these three parameters and Program 1 gives a simple renditioning of *'Auld Lang Syne'*. The pitch and duration of the notes are held in the data statements. The pitch and duration of 0 and 5 give small gaps between two notes of the same pitch which correspond to lifting off your finger from a piano keyboard for instance. Save the program on cassette as we will be using it later to demonstrate the CPC 464's QUEUE facility.

The fourth parameter in the SOUND command is VOLUME. This can range from 0 (no volume) to 7 (max. volume). If envelope shaping is used the volume range is from 0 to 15.

The next two parameters specify the VOLUME ENVELOPE (ENV) and TONE ENVELOPE (ENT). Volume envelope specifies how the volume of the note is to rise and fall — usually

program listing 1

```
1000 READ pitch,duration
1010 IF pitch <> -1 THEN SOUND 2,pitch,duration ELSE END
1020 GOTO 1000
1030 DATA 638,60,478,85,0,5,478,25,0,5
1040 DATA 478,60,379,60,426,90,478,30,426,60
1050 DATA 379,60,478,85,0,5,478,30,379,60,319,60
1060 DATA 284,175,0,5,284,60,319,90,379,25,0
1070 DATA 5,379,60,478,60,426,90,478,30,426,60
1080 DATA 379,60,478,90,568,25,0,5,568,60
1090 DATA 638,60,478,120,-1,-1
```

Program 1 "Auld Lang Syne"

program listing 2

```
10 SOUND 1,100,200
11 SOUND 1,125,200
12 SOUND 1,150,200
20 SOUND 2,400,200
21 SOUND 2,375,200
22 SOUND 2,350,200
30 SOUND 4,200,200
31 SOUND 4,225,200
32 SOUND 4,250,200
```

Program 2 Demonstration of Rendezvous facility

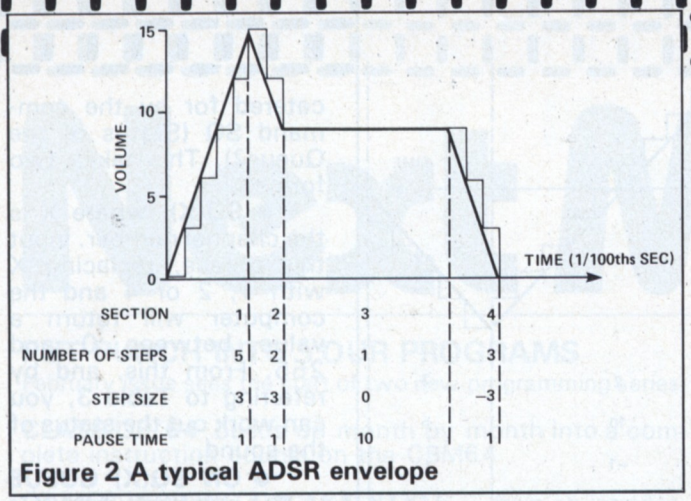

Figure 2 A typical ADSR envelope

known as the ADSR (attack,decay,sustain, release). The tone envelope controls the variation in the pitch of the note which will produce vibratos and glissandos. Fifteen different envelopes (1 to 15) can be used for both ENV and ENT.

Volume envelope (ENV)

Figure 2 shows a typical ADSR envelope. There are four sections which correspond to the attack,decay,sustain, release. Up to five sections can be defined for ENV if required. The rise and fall in volume is calculated in steps. The number of steps (0 to 127), the step size (−128 to +127), and the pause time in 1/100ths of a second (0 to 255) must be given. If Figure 2 was defined as ENV 1 then it would be set up by:

```
ENV1,5,3,1,2,-3,
1,1,0,10,3,-3,1
```

Figure 3 shows an envelope for a tremelo effect. If defined as ENV 2 this would be:

```
ENV 2,2,1,4,2,-1,4
```

To see what the two envelopes sound like, enter the following program:

```
10  ENV 1,5,3,1,2,-3
    1,1,0,10,3,-3,1
20  ENV 2,2,1,4,2,
    -1,4
30  SOUND 2,478,
    -30,5,1
40  SOUND 2,478,
    -30,5,2
```

Lines 10 and 20 define the two envelopes. Line 30 plays middle C (478) at volume 5, with envelope 1. The duration value is a negative number which sets the number of times that the envelope is repeated as opposed to the actual duration time. Line 40 is identical but uses envelope 2. Naturally with five sections and a large range of steps, step size and pause time, the variety of volume envelopes that can be created is huge.

Tone envelope (ENT)

The tone envelope is virtually identical to the volume envelope except that the *pitch* of the note is varied. The number of steps, step size, pause time and number of sections are identical to ENV. Figure 4 shows an envelope for a vibrato effect. To repeat the tone envelope the ENT number is made negative and the duration value is set as normal. Try the following:

```
10  ENT -2,5,1,1,10,
    -1,1,5,1,1
20  SOUND 2,478,500,
    5,0,2
```

Note that the ENT value in the SOUND command in Line 20 is expressed as a *positive* value. The difference between vibrato and tremelo may appear small, but on a high class synthesizer or organ it is considerable.

ENT can also be used to produce glissandos and cascade effects. If section 3 of Figure 4 is omitted the pitch of the note will continue to rise. Try it by changing line 10 to:

```
10  ENT -2,5,1,1,10,
    -1,1
```

Using different values for ENT and ENV, and possibly combining the two envelopes, the sound possibilities are limited only by your own imagination.

The final parameter for the SOUND command is NOISE, a value between 0 and 15 producing white noise. The following program demonstrates the range of white noise available:

```
10  FOR RANGE = 0 TO
    15
20  SOUND 2,0,6,7,0,
    0,RANGE
30  NEXT RANGE :
    GOTO 10
```

White noise is used to produce gunshot and explosion sounds, usually with the use of envelope shaping. The following envelope defines a rapid rate of fall in volume from maximum to nil:

```
10  ENV 1,15,-1,3
```

To produce a gunshot sound try:

```
20  SOUND 2,0,45,0,1,
    0,15
```

Note that the duration time of 45 matched up with the time that ENV 1 will take to run (15 steps * 3). Setting a longer duration time will make no difference, but a shorter one will. If you change the step pause time in ENV to 10 and lengthen the SOUND duration to 150 then the gunshot sound will become more like an explosion.

Sound queue

Each of the three channels A, B and C have their own sound queue containing up to five

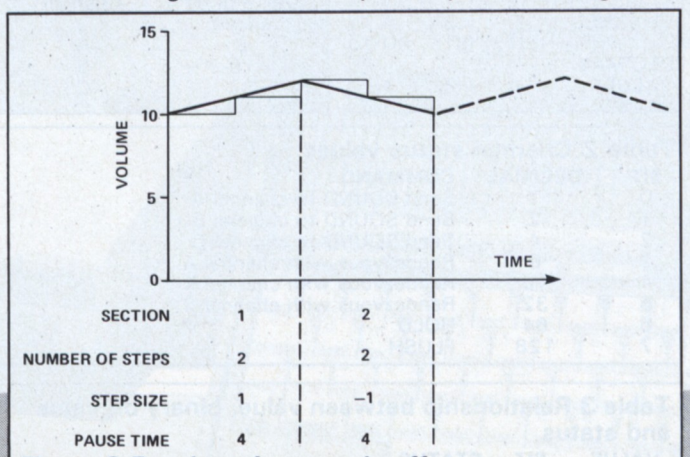

Figure 3 Envelope for tremelo effect

notes or sounds. The first note in the queue is the 'active' note i.e. the one that is currently playing and when this is finished the next note in the queue will be 'fetched out' and played, at the same time leaving a free space in the queue. Remember that the CPC464 has three sound queues and by using the rendezvous facility, it is possible to synchronise notes on different channels when required. To rendezvous channels values are added to the channel status number as shown in Table 1. Program 2 demonstrates this facility.

When you run this program you will hear notes produced on the three separate stereo channels but the BASIC is so quick that the channels will appear perfectly synchronised. Add the following lines which will cause a delay between the channels and the sound will no longer be synchronised.

```
15  FOR X=1 TO 500: NEXT
25  FOR X=1 TO 500: NEXT
```

To re-synchronize the three channels put in the following lines which have been worked out from the synchronization values given in Table 1.

```
10  SOUND 1+16+32, 100,200
20  SOUND 2+8+32, 400,200
30  SOUND 4+8+16, 200,200
```

However, an easier way to accomplish the same thing is to hold the sound at the head of each queue by adding the value 64 to the channel status number. Try changing these three lines to:

```
10  SOUND 1+64,100, 200
20  SOUND 2+64,400, 200
30  SOUND 4+64,200, 200
```

If you run the program nothing happens since '64' holds the sound at the head of each queue until it is 'triggered' by the following entered in the immediate mode:

```
RELEASE 1+2+4
```

Another value is used for channel status. This is 128 which is the FLUSH command and will override any sound currently playing to leave the queue(s) empty. If you add:

```
40  SOUND 1+2+4+ 128,500,200
```

then all the sounds queueing up (and being held) will be cleared and the sound produced by Line 40 will be played. Table 2 shows the channel status values.

No queue jumping

The purpose of the sound queue is to enable the main program to continue with its tasks while the sounds are being played. But what happens when the queue is empty and there are say 20 notes or sounds to be played? This situation is catered for by the command SQ (Status of the Queue?). This takes two forms.

- **SQ(X):** where X is the channel number. Input this phrase, replacing X with 1, 2 or 4 and the computer will return a value between 0 and 255. From this, and by referring to Table 3, you can work out the status of the sound.
- **ON SQ(X) GOSUB — line number:** where X is channel 1, 2 or 4. This is an interrupt command which is triggered when a free space becomes available in the queue, and calls the subroutine specified. Load in Program 1 and add/change the following lines:

```
10    ON SQ(2) GOSUB 1000
20    PRINT "THIS IS A TEST";
30    GOTO 20
1015  ON SQ(2) GOSUB 1000
1016  RETURN
```

When the program is run you will see that "THIS IS A TEST" is printed out continuously while the tune is being played. When a free space in the queue occurs, subroutine 1000 is called and another two values are placed in the queue. Line 1015 is needed as the interrupt routine disables itself when called and this line re-enables it. The only thing to beware of is not to overfill the queue or it may get 'hung up'.

The CPC464's sound facilities are very extensive and excellent. In this article I have only touched on a few aspects and you will have a long and interesting experience investigating them.

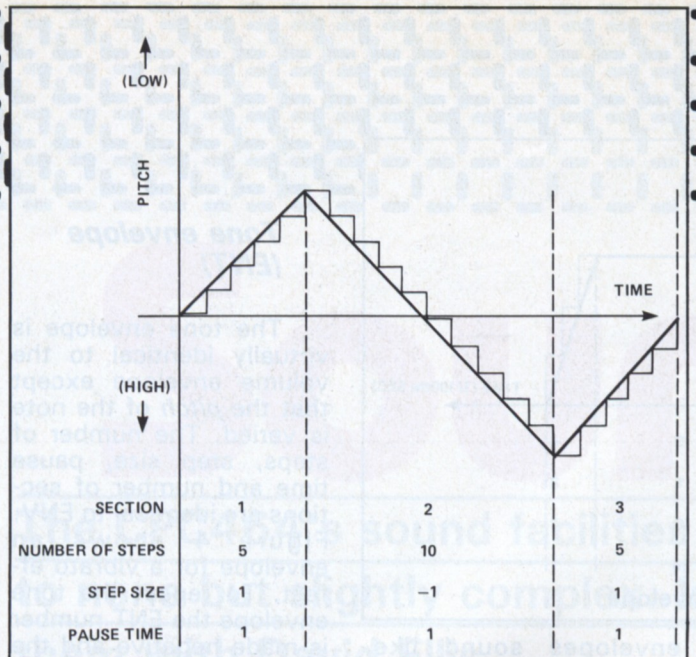

Figure 4 Envelope for vibrato effect

Figure 1 Channel selection

CHANNEL	C BIT2	B BIT1	A BIT0
DECIMAL VALUE	4	2	1

Table 1 Rendezvous channels

Value to be added	Channel
8	A
16	B
32	C

Table 2 Channel status values

BIT	DECIMAL	COMMAND
0	1	Send SOUND to channel A
1	2	Send SOUND to channel B
2	4	Send SOUND to channel C
3	8	Rendezvous with channel A
4	16	Rendezvous with channel B
5	32	Rendezvous with channel C
6	64	HOLD
7	128	FLUSH

Table 3 Relationship between value, binary bit value and status

VALUE	BIT	STATUS
0-4	0-2	Number of free spaces in the queue
8	3	Rendezvous with channel A showing at head
16	4	Rendezvous with channel B showing at head
32	5	Rendezvous with channel C showing at head
64	6	Head of queue is in HOLD state
128	7	Channel currently playing

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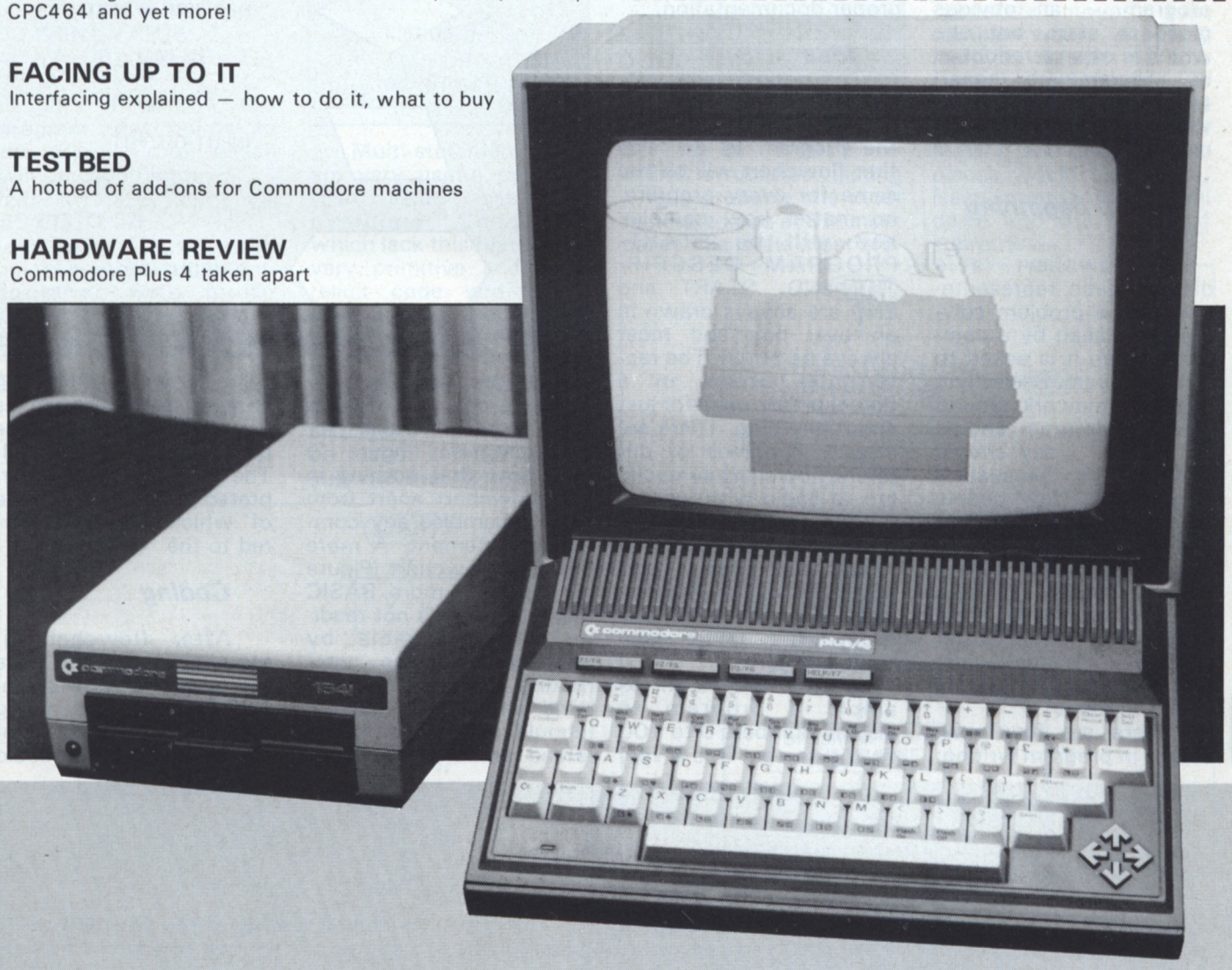

BASIC kit

In the beginning there was an idea . . . . David Ellis explains how to put it into action on your computer.

This series is aimed at the newcomer to programming. Some of you will already have a basic knowledge of computing gleaned from your 'User Manual' or simply from seeing programs in operation on your computer. Each month we will cover a specific area of programming building on the information in each 'lesson', leading you gently into the more advanced aspects of the subject.

This month, the first article in the series will cover a fundamental method of planning your program — an obvious place to start, but one which is often overlooked by programmers 'eager' to get down to the real work of writing commands.

In the beginning

A flowchart is a diagrammatic representation of the problem solving path taken by a computer when it is asked to run a program. Basically it is the framework around which a program should be written. I say *should* and not *is* because I suspect that few people take the trouble to plan out their programs in this way but if you always follow a basic plan, you will find writing the program very much easier and it is essential when writing complex machine code programs.

There are four main stages in program writing:

- program description or idea
- division of program into units
- flowcharting each unit
- coding each unit

To these could be added the testing and debugging of the program and most important of all, proper documentation.

Idea

This should be a brief outline of what you want the program to do. The first flowchart will be the same for every program, no matter how complex and will be START-PROGRAM DESCRIPTION-END. START and END are always drawn in an oval box and must always be put in. The rectangular boxes in a flowchart are used for just about anything. There are literally hundreds of different flowchart symbols, but to begin with, use as few as possible. Figure 1 shows the five most commonly used ones — personally I use only the first three. The triangular box is always used for decisions and tests.

Let us take as an example a program to display numbers 0 to 100 on the screen. It is a very simple program and only requires one unit. Take a look at the flowchart for this program (Figure 2) and note that nothing in the flowchart apart from END resembles any computer statement. A more detailed flowchart (Figure 3) contains more BASIC language and is not readily understandable by someone new to computing. Statements of the kind shown in Figure 3 should be avoided; instead statements of the type shown in Figure 4 should be used. This flowchart is a compromise between figures 2 and 3. The '←' should be interpreted as 'takes the value of' which is to be preferred to the '=' sign.

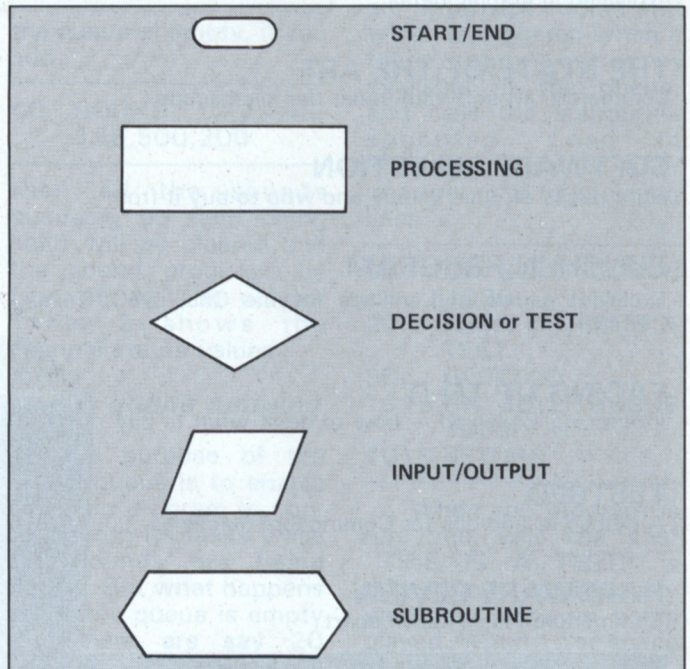

Figure 1 Common flowchart symbols

Coding

After flowcharting, the next stage is to code the program. As a beginner you will be using BASIC as your programming language but it could

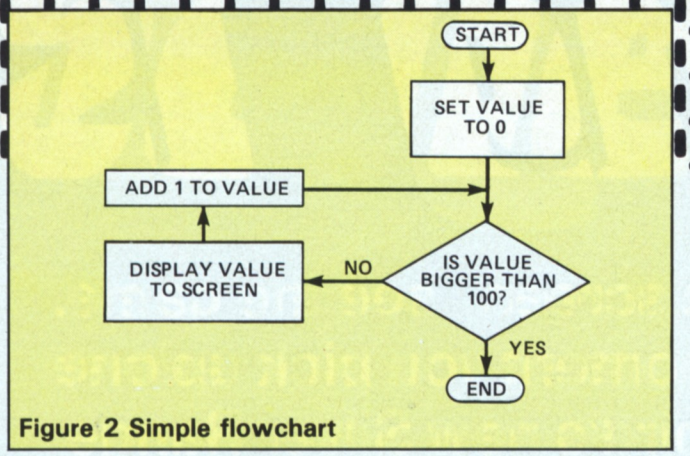

Figure 2 Simple flowchart

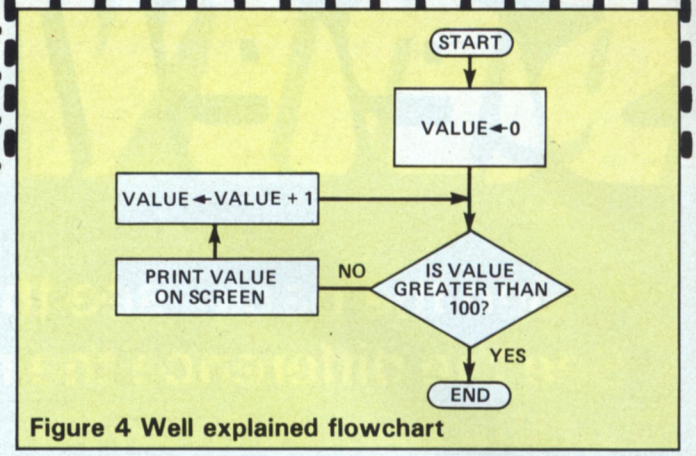

Figure 4 Well explained flowchart

also be FORTH or PASCAL or machine code. The first box in Figure 4 would be coded to the following line:

```
10 LET VALUE=0
```

The decision box is next and is coded as:

```
20 IF VALUE >100
THEN END
```

If you do not have the ELSE option on your computer then this would be followed by:

```
30 PRINT VALUE;
40 VALUE=VALUE+1
```

The flow of the program now 'points' to the decision box which will be coded into:

```
50 GOTO 20
```

The ELSE statement, together with multi-statement lines would produce:

```
20 IF VALUE >100
   THEN END ELSE
   PRINT VALUE;:
   VALUE=VALUE+1:
   GOTO 20
```

Listing 1

```
10 LET VALUE=0
20 IF VALUE<101 THEN PRINT VALUE;:
   VALUE=VALUE+1:GOTO 20
30 END
```

Listing 2

```
10 LET VALUE=0
20 REPEAT
30 PRINT VALUE;:VALUE=VALUE+1
40 UNTIL VALUE=101
```

Listing 3

```
10 LET VALUE=0
20 WHILE VALUE<101
30 PRINT VALUE;: VALUE=VALUE+1
40 WEND
```

Listing 4'

```
10 FOR VALUE=0 TO 100
20 PRINT VALUE;
30 NEXT VALUE
```

Multi-statement lines are very useful provided that they are not overdone. Computers which lack this feature are very primitive and as a result code writing for them can be very tedious. There are other ways of coding our example program and these are shown in Listings 1-4. Listings 2 and 3 can only be used if your micro support the REPEAT... UNTIL or WHILE... WEND structures. Listing 4 is is probably the most familiar to you and in most cases this is the most efficient in terms of speed and memory requirements.

Naturally there are umpteen ways of coding this very simple program — the flowchart merely provides a guide to the general algorithm. A more complex program such as a chess game would require separate modules, each with its own flowchart. Figure 5 shows the general layout.

The three subroutine boxes would each need their own flowchart. The 'generate moves' subroutine would probably need to be split up into further flowcharts and subroutines as this is where all the hard work of moving and checking the pieces would take place. Next months article will delve into the layout of subroutines.

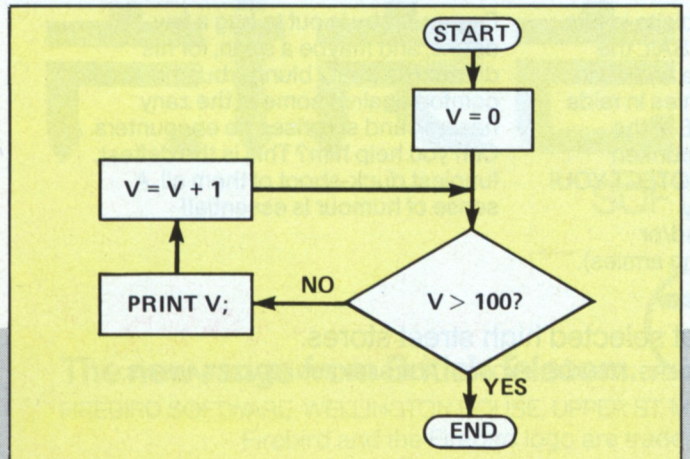

Figure 3 How not to write a flowchart

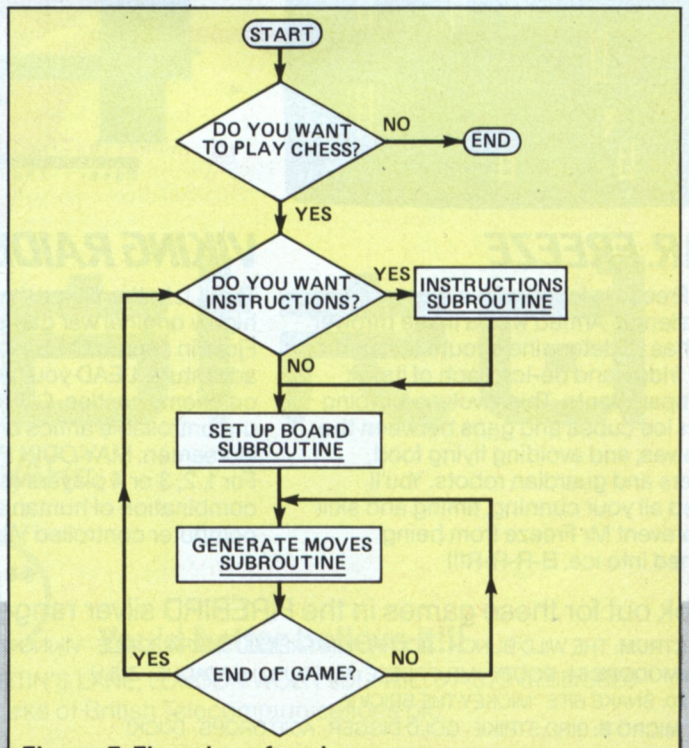

Figure 5 Flowchart for chess program

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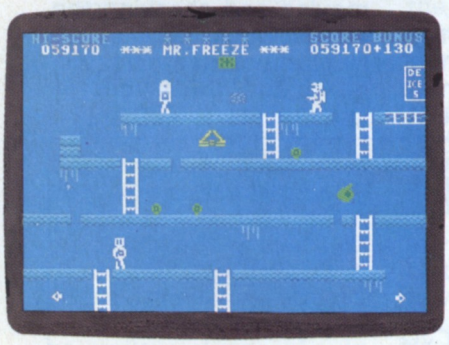

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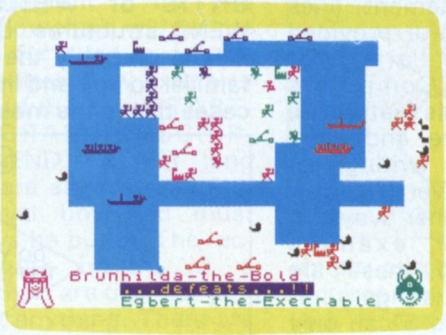

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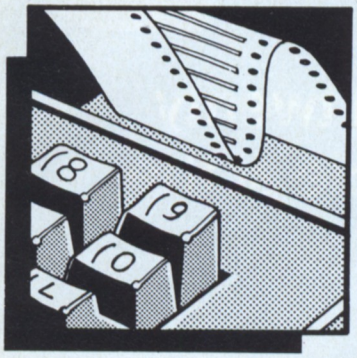


Add-ons from Amstrad

Soon after Amstrad announced their micro, units were available in the shops. This somewhat unusual policy is being pursued with their add-ons, and printers and disk drives are now on sale. Simon Rockman tests them out.

CPC 464

AMSTRAD DDI-1 FLOPPY DISK DRIVE AND INTERFACE

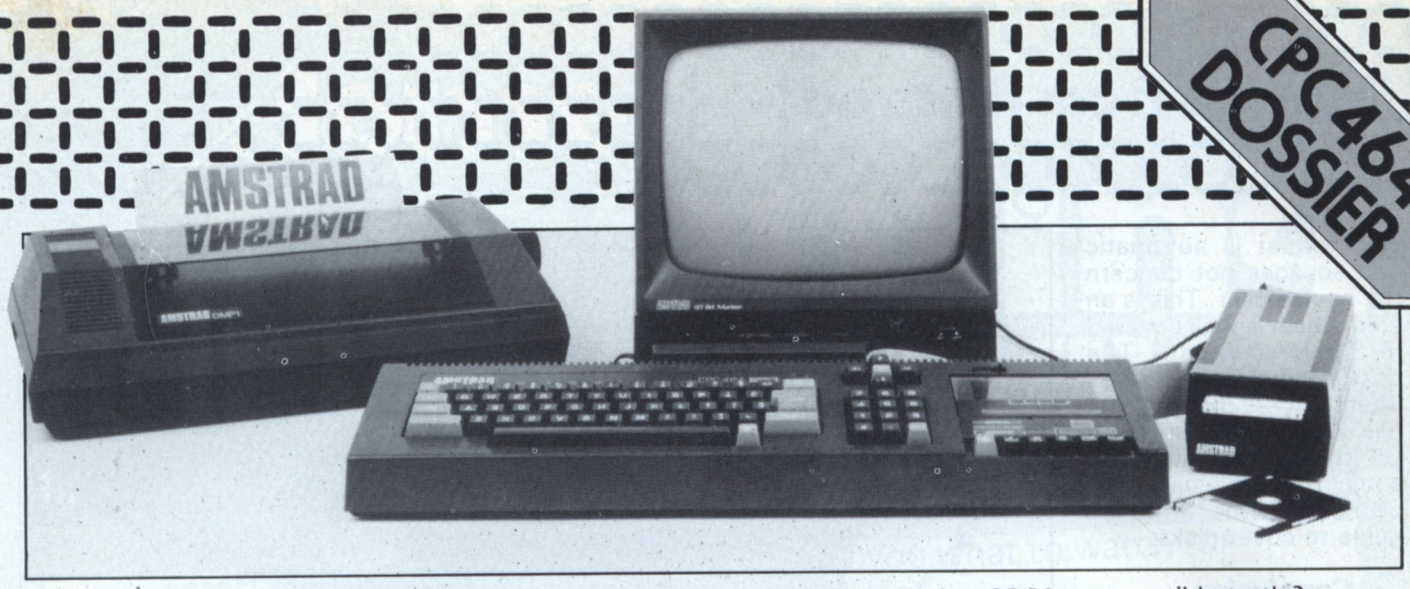
A disk system greatly enhances any computer system. It is not until you have used such a system that you can appreciate the difference it makes. Even the high tape speed on the CPC464 seems puny when compared with the speed of the disks and interface. A 24K program takes about 7 seconds to load.

The system is neat and, like the computer, well documented with a good selection of examples. The Disk Operating System (DOS) has been written by Locomotive Software and neatly patches into the existing set-up.

Hardware

Physically the disk drive is a small box, a little taller and a little deeper than the side of the computer. This is connected to the "Floppy Disc" connector at the back of the machine by a ribbon cable and interface box which looks like a typical Spectrum add-on being flat and L-shaped. The disks themselves are of the Hitachi 3 inch type. These are electrically the same as a 5 ¼ inch floppy disk so you could attach a standard disk drive instead of or in addition to the Amstrad supplied unit.

The size and robustness of the Hitachi disks makes them much more attractive than the 5 ¼ inch type. They are more expensive due to the plastic case, but the ability to carry them around in



the pocket makes them as convenient as cassettes. The Sony disk system uses a similar type of disk and this was considered by Amstrad for use with the CPC 464. However the cost of this unit to Amstrad was roughly twice that of the Hitachi drive. This is a shame since the Sony format is being accepted by such heavyweights as Hewlett-Packard, Commodore, Acorn, IBM and Apple. According to Sony their format is being accepted as the MSX standard. Not surprisingly Hitachi are not very happy about this and they claim that there is no standard size for an MSX disk.

The effect of this on the Amstrad disk owner will be a limited number of suppliers for blank disks and a consequently higher price. However, since all the MSX hardware is so expensive, the Hitachi option should work out better in the end. Quite a few manufacturers use 3 inch disks, particularly for use with home micros.

There is the facility to add a second disk drive onto the system. This does not require a manual, interface or system disk and is £50 cheaper. It is a shame that the disk drive requires a second mains plug since this ruins the CPC464's concept of being a tangle free system. I am told that the computer could power a single disk from its internal supply. However, disk motors are not the nicest of things to have connected to something as power sensitive as a computer and are best kept separate. The speed of the disk is pretty impressive and rivals the very fast Acorn system. It is certainly worlds apart from the Commodore and Atari serial disk systems. Amstrad intend to sell the disk system very hard and the hardware merits this.

Software and documentation

Since the disk system comes with CP/M there is a wealth of software which should run on the CPC 464. However there are two major problems. One simply solvable and one not. The easy problem is that of disk format. Most CP/M software is supplied on 5¼ inch disks which won't work in the Amstrad drive. This can be cured either by connecting both types of drive up to the same computer and copying or by porting software over a link between a CPC 464 and a computer which has the correct disk format. This does require the consent of the originator of the program but in the world of expensive CP/M programs this is not very difficult to obtain.

The major problem encountered with CP/M is the lack of memory with the Amstrad system. The CPC 464 has 64K of memory. 16K of this is dedicated to the screen. Then there is an overhead for the BIOS, the machine specific part of CP/M, plus a thing like the computer's own memory handling. All this leaves the poor user with only 39K to use from CP/M. For many of the smaller programs this is adequate, unfortunatley this is not true for Wordstar, the main word-processor.

Anyone who is at home with CP/M will find little to complain about when using the Amstrad system. The computer's 80 column display means that CP/M is much more usable on a CPC 464 than on a Commodore 64 or Tatung Einstein. All the usual CP/M utilities are included plus Digital Research Logo. This means that anyone writing disk based software can assume that the user has a copy of D.R. Logo. This is an interesting choice of language and should produce a spectacular set of screen dumps. How long before some enterprising manufacturer produces a compatible turtle?

For anyone using BASIC the main contact with the disk system is through AMSDOS. This adds extra commands to BASIC by using the bar '|' external command facility. AMSDOS is like a very good cassette operating system but has a few limitations. There is no easy way to delete a file. The ERA command requires a string variable to be specified, so while |ERA,@A$ is valid |ERA,@"FRED" is not. Wildcards are accepted so there is no need to write a program to delete a selection of files.

The official Amstrad line on this is that all the housekeeping can be done from CP/M and so there is no need to go overboard in implementing it twice. There are no true random access files available from AMSDOS which makes life a touch more difficult for anyone writing a database but helps to boost speed.

The programmer will have fun with the system when the disk interface is added. The memory map is affected and things like the area which holds user defined graphics moves. There are three disk formats to allow different types of disk to be read. This is of more use when a 5¼ inch disk is connected. Detection of the

disk format is automatic and so does not concern the novice user. This is an area which is well covered in their manual. The documentation is thick. There are chapters on the use of disks, AMSDOS, CP/M, Logo and machine code. There will be a supplement to the firmware guide to cover disks.

Conclusion

At £199 the Amstrad DDI-1 is pretty cheap. When you consider it comes with an interface, CP/M, Logo and excellent documentation there is no room for anyone to compete. It compares favourably with the disk systems from any of its rivals. The choice of the Hitachi format, whilst logical may prove to be a bit of a problem. The success of this product really depends on the ability of Amstrad to get over its advantages to its customers. A CPC 464 without a disk is only half a system. I doubt that Amstrad will have any problems in reaching their targets.

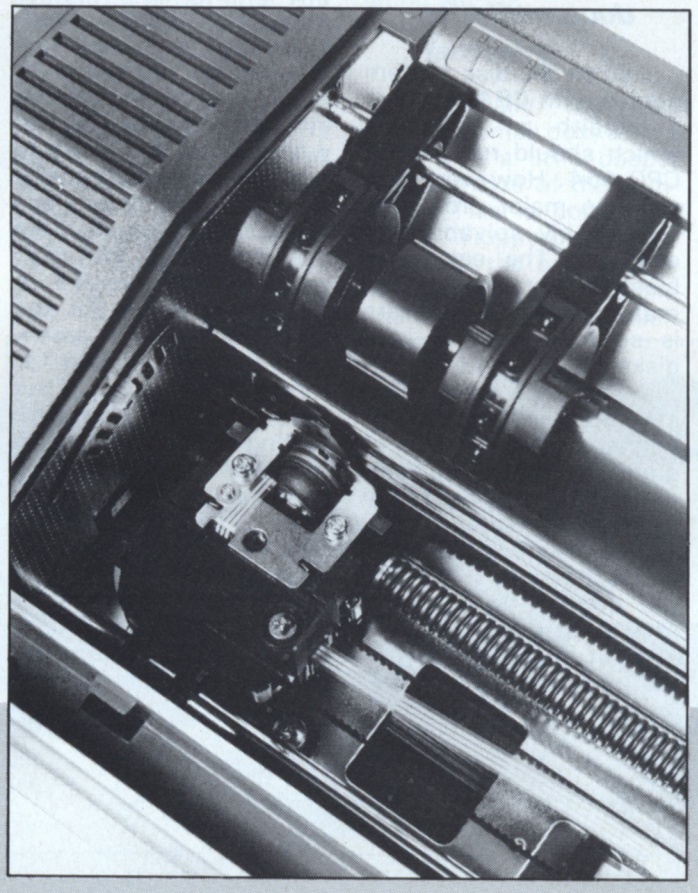
AMSTAD DMP-1 DOT MATRIX PRINTER

It is common practice among computer manufacturers to package someone else's printer as their own. The Epson printers wear Hewlitt-Packard and Memotech badges and all the Commodore printers are made in someone else's factory.

The Amstrad DMP-1 is the same as the Siekosha GP500A and very similar to the Commodore MPS801. All three of these machines are made by Seikosha but the Commodore version has a special interface and a changed character set.

Since the CPC464 has a standard Centronics interface there is no need for a major modification. I did, however, expect that the DMP-1 would have the same character set as the CPC 464. It doesn't! There are no little men or bombs.

The ribbon with this device is a cartridge which moves up and down with the print head in the same way as in an expensive typewriter. The ribbon is a short, endless loop which is kept inked by a felt-tip like device. This system does not work very well and the ribbons have a very short life. They are also very difficult to buy. Since most Commodore dealers sell the MPS801 it should be an easy thing to buy a ribbon. It isn't.



Neither the print quality nor the speed are spectacular features of this printer. The typeface lacks true descenders, that is the letters which should go below the line like, 'j', 'g' and 'p' get pushed up. This is uncomfortable to read. There are no facilities for underlining or emboldening text and none of the standard controls such as the changing of line spacings are implemented. This is fine if you just want to print listings but not satisfactory for any work which involves text.

At 50 cps (characters per second) it is slow for a dot matrix printer. The noise level is acceptable but not good. The German distributor for Amstrad did not think that the DMP-1 was good enough and so they sell the Texan/Kaga KP810 for use with the CPC 464. All in all I was disappointed with the DMP-1 and at £199 it is £25 more expensive than its Seikosha twin.

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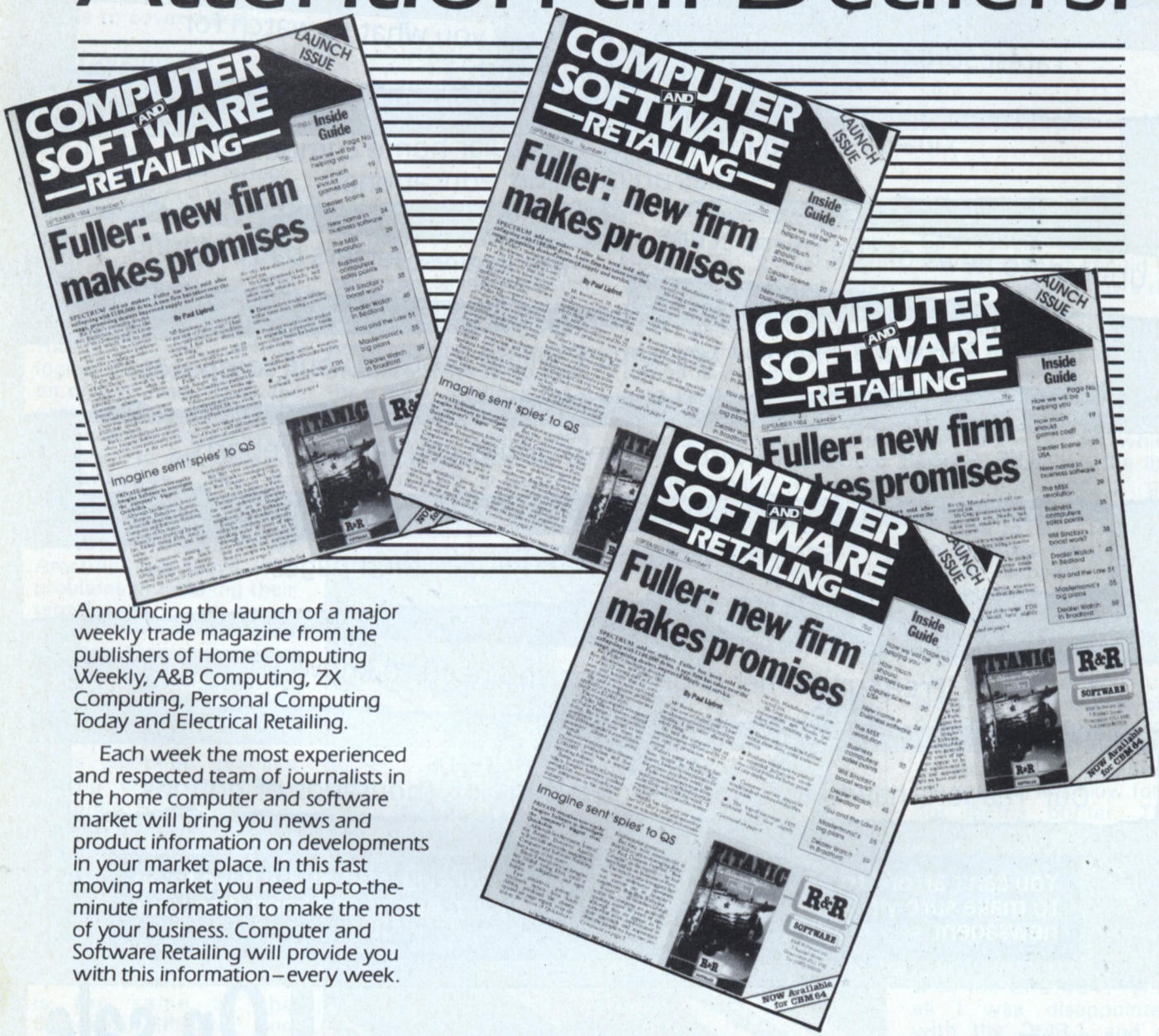

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CPC 464 DOSSIER

Golden Ikon of Ramesis

Steve Lucas needs some help in his search for the treasure of the temple!

For many years I have been hearing rumours that in a distant valley there lies an old temple which once belonged to Ramesis himself. Travellers to this valley tell of the curse which lies upon the temple and of the mysterious deaths of all who try to enter to recover the Golden Ikon of Ramesis.

Being of staunch heart these rumours did not deter me and I set forth to find the Ikon for myself. When I arrived at the entrance to the temple in the Valley of the Kings, I sent all my assistants into the antechameber to search but none returned. I now have to venture in myself. Please help me by giving me instructions in the form of two word sentences such as GET LAMP, LIGHT LANTERN or just use the initials N,S,E,W to move around.

Here is a list of some of the words I understand:

N,S,E,W,IN,OUT,UP, DOWN,IN,OUT,PRAY, JUMP,CLIMB,HELP, LOOK,SEARCH,EAT, DRINK,GET,TAKE,GRAB, INVENTORY,SCORE, THROW,KILL,DROP,KILL, LEAVE,ATTACK,HIT, PUT,SWIM,SAIL,OPEN, PULL,PUSH,CLIMB, DIG,DIVE,SAY,TALK, ASK,RUB,GO

Take note

When typing in the listing pay especial care to the spaces between characters. These must be typed in *exactly* as shown. As a check, type in the listing in lower case and then list it. All keywords should have been transferred to upper case. If they aren't, check for mistakes in your typing.

hints on conversion

1. LOWER$ is used to convert a string variable into lower case (even if it contains a mixture of upper and lower case). This will need to be replaced with an appropriate routine.
2. The WHILE WEND loop, which is the main control loop, will need to be replaced with a conditional GOTO.
3. PEN is used to select the foreground colour, whilst INK selects the colours used in MODE 1 (this is equivalent to VDU19 on the BBC and Electron).
4. BORDER selects the border colour and can be ignored.
5. Print CHR$(7) sounds a beep sound (the same as on the BBC/Electron)
6. LOCATE places the text cursor at the x,y coordinates and can be replaced by PRINT TAB(x,y) on the BBC/Electron, PRINT @ on the TRS80, PRINT AT x,y on the Spectrum and PLOT x,y,string on the Oric. The program is written in fairly standard MICROSOFT syle BASIC and will need little conversion to run on most machines, although the string handling will need changing on Sinclair micros.

how it runs

Line	Effect
40	Selects colours
50	Titles
60-200	Read data/fill arrays and initialise variables
220-680	Main control loop. 'while location is not equal to 21 . . repeat' may be replaced with GOTO or REPEAT UNTIL
230-270	Check traps
280	Describes location
300-350	Describe directions
360-400	Describe objects
410-420	Input action
430-680	Call subroutine
690-720	Solve adventure
730-END	Subroutines for actions (REM statements explain their actions)

variables used

x,y,h,e%,l%	general variables
q$(x)	locations
s%,(x,y)	map
g$(x)	objects
b%(x),n%(x)	pointers
z$,b$,c$,d$	input strings
l$	second word of input
aa%-az%	flags
e%,f%,l%	check conditions
n$(x)	words understood

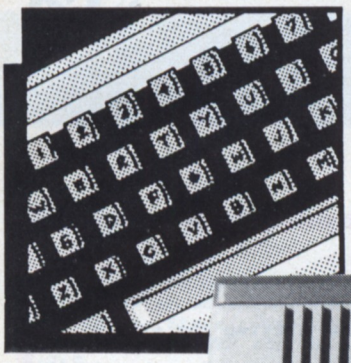
program listing

```
10 REM ** The Golden Ikon of Ramisis **
20 REM ** an adventure for the Amstrad CPC464 **
30 REM **  Steve Lucas  September 1984 **
40 MODE 1: BORDER 15: INK 0,1:INK 1,24:INK 3,20:INK 4,6
:CLS
50 GOSUB 1610
60 DIM s%(25,4),q$(21),x$(90),g$(35),v$(6),b%(35),n$(35
),n%(35)
70 s%=0:p%=1
80 FOR x=1 TO 21:READ q$(x):FOR y=1 TO 4: READ s%(x,y):
NEXT y,x
90 FOR x=1 TO 15:READ g$(x),b%(x):NEXT
100 FOR x=1 TO 18:READ n$(x),n%(x):NEXT
110 DATA at the entrance to the Golden Temple of Ramisi
s. Two large eyes gaze at me from the painted statue to
 my left.,0,0,0,0,stan
ding in a small chamber. Steps lead down from here. A s
trange liquid drips  down the walls.,0,0,0,0
120 DATA standing in a pool of water in the      centre
 of a vast chamber. A golden       statue of Ramisis sta
nds to my right.,0,0,0
,2,at the bottom of a flight of stairs. A  gently slopi
ng passage leads South from here.,0,5,0,0
130 DATA at the edge of a deep precipice. I can  just m
ake out a light on the far side.,4,0,6,0,in a small cha
mber. One of the walls
 is marked with strange inscriptions.,0,0,0,5,at the so
uthern edge of a deep precipiceA plank of wood stretche
s across.,5,0
140 DATA on a narrow ledge. A dark precipice liesto the
 North.,0,9,0,7,in a downward sloping passage.,8,10,0,0
,in an enormous cavern
. Two grotesque     faces stare at me from windows in a
    gallery high above me
150 DATA 9,0,11,12,trapped in a giant spiders web which
    hangs from above,0,0,0,0,on the shores of a subterr
anean lake.,0,0,10,0,i
n an enormous cavern. I hear the sound of water to the
north,0,14,0,0
160 DATA in the anteroom of Salvia. The walls     reflec
t the golden light rays which      come through the open
ing above me.,13,0,0,0
,in a secret passage.,0,16,0,14,at the Southern end of
a narrow passage.A wider passage leads East.,15,0,17,0
170 DATA in a small room cut into one side of a  long p
assage. Small insects crawl all   over the walls and ce
iling,0,18,0,16,at the
 bottom of a sheer rock face,17,0,0,0,at the top of a s
heer rock face. The     drop is enormous. A passage lead
s West,0,0,0,
180 DATA by a panel. A loud voice booms out of   the fa
ce on the wall 'ONLY THOSE WHO POSSESS THE IKON MAY
 PROCEED !',0,0,19,0,s
tanding outside the pyramid with the   famous 'IKON of
RAMISIS',0,21,21,21
190 DATA a coil of rope,1,a lantern,1,a narrow plank of
 wood,3,a plaque with writing on it,6,a golden statue,5
,a small reptile,4,a s
piders web,10,a sharp knife,3,the IKON OF RAMISIS,17,a
metal ring hanging from the ceiling,18,a golden efigy,2
0
200 DATA a small casket,14,a small phial,3,a bird,9,a s
mall lever,4,coil,1,rope,1,lantern,2,plank,3,wood,3,pla
que,4,statue,5,reptile
,6,web,7,knife,8,ikon,9,metal,10,ring,10,effigy,11,cask
et,12,phial,13,bird,14,lever,15
210 CLS
220 WHILE p%<21
230 IF p%=14 THEN PRINT"A voice booms out 'What do you
want ?'"
240 k=0:IF p%>1 AND ab%<>1 THEN x$="I trip in the dark.
": GOSUB 1150
250 IF p%=11 THEN PRINT"I think I could be here forever
 !"
260 i%=i%+1:IF i%>75 THEN PRINT"A voice booms out 'You'
ve been here long enough"
270 IF i%>100 THEN x$="'A voice booms out 'I did wanrn
you  andI feel a sharp pain in my ribs!":GOSUB 1150
280 PEN 1: PRINT:PRINT"I am :-":PEN 2:PRINT q$(p%)
290 PEN 1:a$="":IF s%(p%,1)>0 THEN a$="North"
300 IF s%(p%,2)>0 AND LEN(a$)>0 THEN a$=a$+",South" ELS
E IF s%(p%,2)>0 THEN a$="South"
310 IF s%(p%,3)>0 AND LEN(a$)>0 THEN a$=a$+",East" ELSE
 IF s%(p%,3)>0 THEN a$="East"
320 IF s%(p%,4)>0 AND LEN(a$)>0 THEN a$=a$+",West" ELSE
 IF s%(p%,4)>0 THEN a$="West"
330 IF p%=1 THEN a$="In" ELSE IF p%=2 THEN a$=a$+" Down
,Out" ELSE IF p%=4 THEN a$=a$+",Up"
340 IF p%=11 AND a$="" THEN a$="I can't go anywhere!"
350 PEN 1: PRINT:PRINT:PRINT"I can go":PEN 3:PRINT a$:P
EN 1
360 e=0:FOR t=1 TO 15:pp%=0:IF b%(t)=p% THEN pp%=1
370 IF pp%=1 THEN 390
380 NEXT:GOTO 410
390 IF e=0 THEN PEN 1:PRINT:PRINT"I can see :-"
400 PEN 2:PRINT g$(t):e=e+1:PEN 1: GOTO 380
410 PEN 1:PRINT:PRINT:PRINT"What shall I do now ":INPUT
 z$: z$=LOWER$(z$)
420 CLS:PRINT CHR$(7)
430 b$=LEFT$(z$,2):c$=LEFT$(z$,3):d$=LEFT$(z$,4)
440 IF c$="loo" THEN k=1:PRINT"I see nothing special" E
LSE IF c$="sco" THEN PRINT"This isn't a game you know!"
:k=1
450 IF c$="inv" THEN GOSUB 1030
460 IF c$="tal" OR c$="say" OR c$="spe" OR c$="ask" THE
N GOSUB 1520
470 IF c$="eat" THEN k=1:PRINT"I see no food!" ELSE IF
c$="dri" THEN PRINT"I haven't got anything to drink!":k
=1
480 IF c$="rub" THEN PRINT"Don't be a silly billy!":k=1

490 IF b$="n" OR d$="go n" AND s%(p%,1)>0 THEN p%=s%(p%
,1):k=1
500 IF b$="s" OR d$="go s" AND s%(p%,2)>0 THEN p%=s%(p%
,2):k=1
510 IF b$="e" OR d$="go e" AND s%(p%,3)>0 THEN p%=s%(p%
,3):k=1
520 IF b$="w" OR d$="go w" AND s%(p%,4)>0 THEN p%=s%(p%
,4):k=1
530 IF k=0 AND (b$="n" OR b$="s" OR b$="e" OR b$="w") T
HEN PRINT"I can't do that here!":k=1
540 IF c$="row" OR c$="sai" THEN PRINT"I'd need a boat!
":k=1 ELSE IF c$="up" OR d$="go u" THEN GOSUB 1200
550 IF c$="dow" OR d$="go d" THEN GOSUB 1090 ELSE IF c$
="rea" THEN GOSUB 1320
560 IF c$="in" OR b$="i" OR d$="go i" THEN k=1:GOSUB 10
80 ELSE IF c$="out" OR d$="go o" THEN GOSUB 1120
570 IF c$="unl" THEN PRINT"I see nothing to unlock":k=1
 ELSE IF c$="kil" OR c$="att" OR c$="des" THEN x$="A mu
mmy sneaks up behind m
e and kills me":GOSUB 1150
580 IF c$="pra" THEN k=1:PRINT"That made me feel better
!" ELSE IF c$="cut" THEN GOSUB 1380 ELSE IF c$="pus" TH
EN k=1:GOSUB 1480
590 IF c$="ope" THEN k=1:GOSUB 1350 ELSE IF c$="thr" TH
EN k=1:GOSUB 1400 ELSE IF c$="hel" THEN k=1:PRINT"I'm s
orry I don't have a cl
ue!"
600 IF c$="get" OR c$="tak" OR c$="gra" THEN GOSUB 740
610 IF c$="dro" OR c$="put" OR c$="lea" THEN k=1:GOSUB
920
620 IF c$="exa" THEN k=1:PRINT"I see nothing special!"
ELSE IF c$="sea" THEN k=1:PRINT"I can't find anything h
ere!"
630 IF c$="swi" THEN k=1:GOSUB 1240 ELSE IF b$="fu" OR
b$="fu" THEN x$="How dare you speak like that to me!":G
OSUB 1150
640 IF c$="wai"THEN PRINT"O.K.":k=1:FOR x=1 TO 1000:NEX
650 IF c$="cli" THEN k=1:GOSUB 1440 ELSE IF c$="dig" TH
EN k=1:PRINT"I have no spade!" ELSE IF c$="jum" OR c$="
div" THEN k=1:GOSUB 15
70
660 IF c$="pul" THEN k=1:GOSUB 1280
670 IF k=0 THEN PRINT"I'm so sorry I can't understand t
```

program listing

```
hat    instruction!"
680 WEND
690 CLS:PEN 1: LOCATE 1,3:PRINT"You are standing outsid
e the Pyramid."
700 PEN 3: LOCATE 5,10:PRINT"You have found the IKON of
 RAMISIS !!!!"
710 PEN 2:LOCATE 1,20:PRINT"Well done. You have solved
this          adventure"
720 GOTO 720
730 REM ** get**
740 k=1:GOSUB 870
750 IF l%<>1 THEN RETURN
760 e%=0:FOR x=1 TO 15:IF b%(x)=p% AND b%(n%(r))=p% THE
N e%=1
770 NEXT:IF e%=0 THEN PRINT"I can't see it here!":RETUR
N
780 IF r=1 OR r=2 THEN aa%=1 ELSE IF r=3 THEN ab%=1 ELS
E IF r=4 OR r=5 THEN ac%=1
790 IF r=6 THEN PRINT"It's bolted to the wall!":RETURN
ELSE IF r=7 THEN PRINT"It's too heavy to carry!":RETURN
800 IF r=8 THEN x$="It bites me.":GOSUB 1150 ELSE IF r=
9 THEN PRINT"Don't be so stupid!":RETURN
810 IF r=11 THEN ad%=1 ELSE IF r=12 OR r=13 OR r=14 THE
N PRINT"Don't be ridiculous!":RETURN
820 IF r=15 THEN ae%=1 ELSE IF r=16 THEN af%=1
830 IF r=17 THEN PRINT"It flies away!":RETURN ELSE IF r
=18 THEN PRINT"Don't be silly!":RETURN
840 e%=0:FOR d=1 TO 3:IF v$(d)="" THEN v$(d)=g$(n%(r)):
e%=1:d=6
850 NEXT:IF e%=0 THEN PRINT"I'm sorry my hands are full
!":RETURN
860 b%(n%(r))=0:RETURN
870 l$="":FOR h=1 TO LEN(z$)
880 IF MID$(z$,h,1)=" " THEN l$=RIGHT$(z$,(LEN(z$)-h)):
h=70
890 NEXT:r=0:l%=0:IF LEN(l$)<2 THEN RETURN
900 FOR h=1 TO 18:IF LEFT$(n$(h),LEN(l$))=l$ THEN l%=1:
r=h
910 NEXT:RETURN
920 GOSUB 870
930 IF l%<>1 THEN PRINT"I don't see a ";l$:RETURN
940 e%=0:FOR d=1 TO 3:IF v$(d)=g$(n%(r)) THEN v$(d)="":
e%=1
950 NEXT:IF e%<>1 THEN PRINT"I don't have it!":RETURN
960 b%(n%(r))=p%
970 IF r=1 OR r=2 THEN aa%=0 ELSE IF r=3 THEN ab%=0 ELS
E IF r=11 THEN ad%=0 ELSE IF r=15 THEN ae%=0 ELSE IF r=
16 THEN af%=0
980 IF (r=4 OR r=5) AND p%=5 THEN q$(5)="by a deep prec
ipice. A plank stretches  across.":s%(5,2)=7
990 IF r=4 OR r=5 THEN ac%=0
1000 IF r=16 THEN x$="the phial breaks and a poisonous
gas    overwhelms me!":GOSUB 1150
1010 RETURN
1020 REM ** inventory **
1030 PEN 3:PRINT"I am carrying :-":k=1
1040 f%=0:FOR h=1 TO 3:IF v$(h)<>"" THEN PEN 2:PRINT v$
(h):f%=1
1050 NEXT:IF f%=0 THEN PRINT"nothing at all!"
1060 PEN 1:RETURN
1070 REM ** go in **
1080 IF p%=1 THEN p%=2:PRINT"O.K.":RETURN ELSE PRINT"I
can't do that here":RETURN
1090 k=1:IF p%=2 THEN p%=4:PRINT"O.K.":RETURN ELSE IF p
%=5 OR p%=7 OR p%=8 OR p%=19 THEN x$="I fall to my deat
h!":GOSUB 1150
1100 PRINT"I can't do that here!":RETURN
1110 REM ** go out **
1120 k=1:IF p%=2 THEN x$="A voice booms out 'HOW DARE Y
OU LEAVE   THE TEMPLE !":GOSUB 1150
1130 PRINT"I can't do that here!":RETURN
1140 REM ** lose game **
1150 CLS: LOCATE 1,5: PRINT x$
1160 PEN 3: LOCATE 20,10:PRINT"I am dead !"
1170 PEN 2:LOCATE 2,22:PRINT"Would you like to play aga
in   <Y/N> ?"
1180 a$=INKEY$:IF a$="Y" OR a$="y" THEN RUN ELSE IF a$=
"N" OR a$="n" THEN CLS:PRINT"GOODBYE. Thank you for pla
ying":END ELSE 1180
1190 REM ** go up **
1200 k=1:IF p%=4 THEN p%=2:PRINT"I climb the stairs!":R
ETURN
1210 IF p%=18 THEN PRINT"I'd need to CLIMB up here!":RE
TURN
1220 PRINT"Don't be so stupid!":RETURN
1230 REM ** swim **
1240 IF p%=12 THEN p%=16:PRINT"I swim across!":RETURN
1250 IF p%=13 THEN x$="A strange fish swims across and
bites   into my flesh!":GOSUB 1150
1260 PRINT"Don't be absurd!":RETURN
1270 REM ** pull **
1280 IF p%<>4 THEN PRINT"I'm sorry I can't do that here
!":RETURN
1290 IF ag%=0 THEN ag%=1:PRINT"I hear a distant rumblin
g!":q$(2)=q$(2)+" a secret panel has moved to one side"
:s%(2,3)=3:RETURN
1300 PRINT"nothing happens!":RETURN
1310 REM ** read **
1320 k=1:IF p%=6 THEN PRINT"It reads 'BEWARE OF THE FIS
H!. There is also a strange word FINGLOWIAN inscribed o
n the wall!":RETURN
1330 PRINT"I can't see anything worth reading here!":RE
TURN
1340 REM ** open **
1350 IF ae%<>1 THEN PRINT"I can't see anything to open!
":RETURN
1360 x$="A venomous spider crawls out and bites  me ...
AAAAAAGGGGHHH the pain!":GOSUB 1150
1370 REM ** cut **
1380 k=1:IF p%=11 THEN PRINT"The web's too thick to cut
!":RETURN ELSE PRINT"That's not the right approach.":RE
TURN
1390 REM ** throw **
1400 IF p%=18 AND aa%=1 THEN PRINT"The rope catches on
the ring":q$(18)=q$(18)+"      A rope hangs from above.
": FOR x=1 TO 3: IF v$
(x)=g$(1) THEN v$(x)=""
1410 IF p%=18 AND aa%=1 THEN NEXT:aa%=2:RETURN
1420 PRINT"Don't be silly":RETURN
1430 REM ** climb **
1440 IF p%<>18 THEN PRINT"Not here!":RETURN
1450 IF aa%<>2 THEN PRINT"I can't do that just yet!":RE
TURN
1460 PRINT"I climb the rope!":p%=19:RETURN
1470 REM ** push **
1480 IF p%<>20 THEN PRINT"Not here!":RETURN
1490 IF ad%<>1 THEN x$="'I did warn you ' says a voice"
:GOSUB 1150
1500 p%=21:PRINT"O.K.":RETURN
1510 REM ** say **
1520 k=1:IF p%<6 THEN x$="'How dare you wake me up' boo
ms a voice":GOSUB 1150
1530 IF p%=14 THEN PEN 3:PRINT"What would you like to s
ay to me ":PEN 1:INPUT z$:z$=LOWER$(z$):IF LEFT$(z$,5)=
"fingl"  THEN PRINT"I
will show you a secret passage !":p%=15:RETURN
1540 IF p%=14 THEN x$="You got it wrong !":GOSUB 1150
1550 PRINT"I talk but nobody listens!":RETURN
1560 REM ** jump **
1570 k=1: IF p%=8 OR p%=7 OR p%=6 OR p%=5 OR p%=2 OR p%
=19 THEN x$="I break my neck":GOSUB 1150
1580 PRINT"I can't do that here!":RETURN
1590 REM ** go down **
1600 k=1:IF p%=2 THEN p%=4:PRINT"O.K.":RETURN ELSE PRIN
T"I can't !":RETURN
1610 CLS:PEN 3: LOCATE 8,2:PRINT"The Golden Ikon of Ram
isis"
1620 PRINT:PRINT:PEN 2:PRINT" by      Steve Lucas      Se
ptember 1984"
1630 PEN 1:PRINT:PRINT:PRINT"For many years past I have
 searched for the famous Temple of Ramisis and now I  h
ave found it. I have o
nly one task leftto achieve:- to find and recover the
  famous IKON of RAMISIS"
1640 RETURN
```



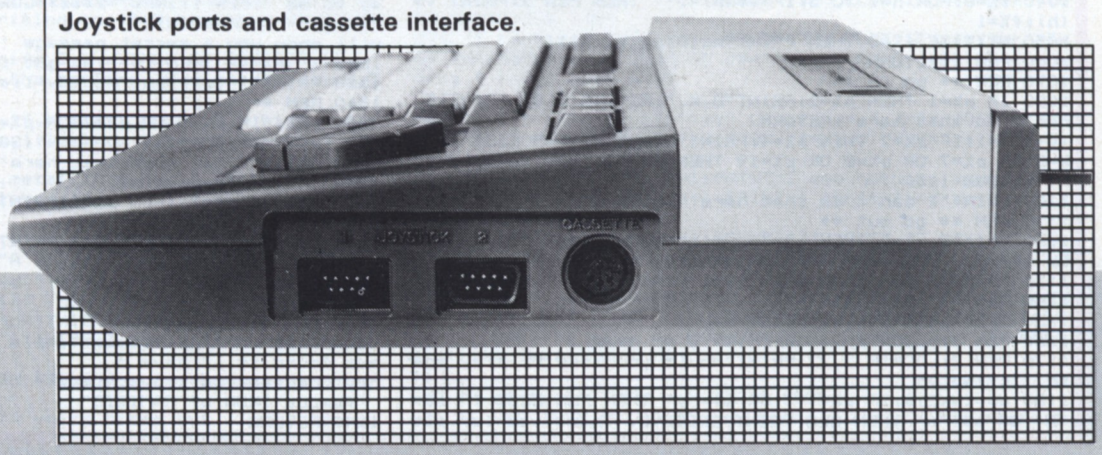
Goldstar

Neat styling of the FC-200 with well positioned cursor keys.

MSX

We've been hearing of the 'wonderful' advantages of the MSX specifications for several months now and even if the concept hasn't yet become the bore of the decade, there's still plently of time before the high street stores get stocked up with the micros! At the time of writing only Toshiba and Sanyo MSX micros are on the retail market, although other companies have been

Joystick ports and cassette interface.



MSX

Available from November, the FC-200 is one of the wave of MSX micros to hit our shores. Bob Wallace takes a look.

supplying their units for review.

Here the Goldstar FC-200 is put through its paces. It is manufactured in Korea and distributed in this country by Microdealer (UK) Ltd. and it has been available to the public since November.

MSXplained

The idea of software compatible machines has already managed to gather a large band of critics who have prejudged the machine on the information gleaned from the basic specifications. The original idea of MSX was that it should be a basic core around which machines could be developed. It is up to the manufacturers to decide what extra features, if any, they add to the specified MSX design.

The Goldstar FC-200 is the cheapest MSX micro to be announced and with 64K user RAM in addition to the mandatory 16K of video RAM required by the Texas Instruments sprite-based video controller, it is aimed at the home and small business market. This review will not be comparative with other MSX micros, but will deal with the basic design and capabilities of the Goldstar.

Clever design

The micro is very well constructed out of two tone high impact plastic. The main body is quite small, but despite its size, manages to house a considerable amount of hardware.

On the right side of the machine there are two joystick ports and a cassette interface. On the back there is an expansion bus, audio, video and RF outputs, not to mention the printer output socket.

With this vast array of sockets and connectors, one might be lead into thinking that the micro is rather cluttered. This is not the case, the designers have produced a stylish and very functional machine.

On the top of the computer is a 73 key keyboard laid out in the normal QWERTY configuration. Above this are five function keys each of which is capable of two functions. One striking and very functional design point is that the cursor control keys are separated out from the rest of the group and nestle in a cluster on the right of the keyboard. This aspect will probably be exploited to its fullest by the game players among you.

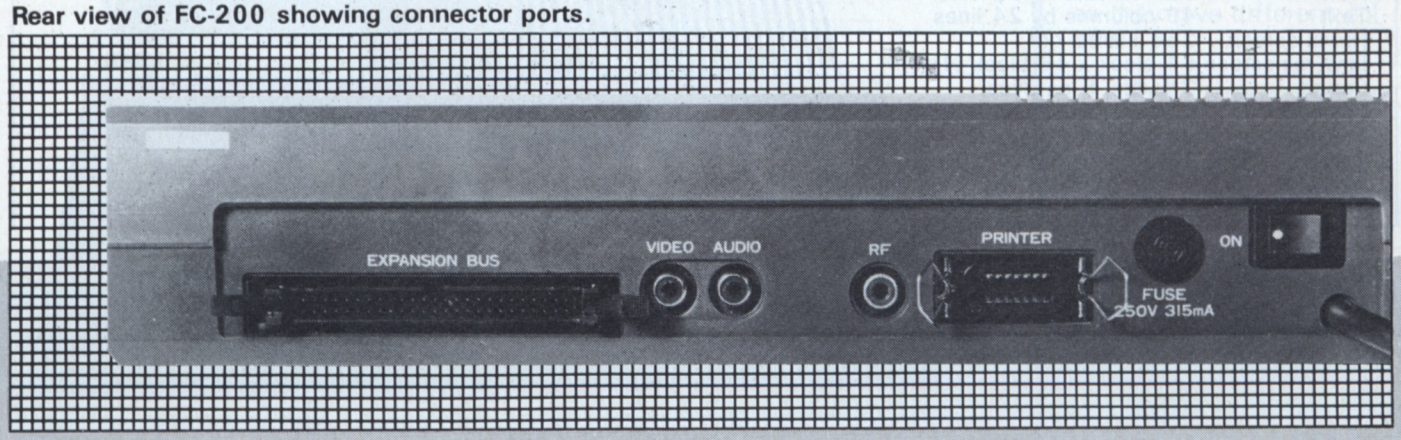
The keys are quite firm to the touch and have a positive response. In fact, the FC-200 keyboard is probably the best of any micros I have used.

Interior design

On peering inside the casing, a very neat main circuit board containing the Z80A CPU at 3.58MHz can be seen. Close to the CPU is the AY3-8910 sound chip which is capable, with careful programming of producing quite complicated sounds.

One chip that denies all access to its origins can only be the TMS

Rear view of FC-200 showing connector ports.



9918A graphics chip, which although dated in terms of technology, gives you the ability to control impressive graphics and sprites. Finally, there are two EPROMs, which I assume hold the basic ROM. The BASIC supported by the MSX machines is an upgraded version of the Microsoft BASIC, which copes with enhanced graphics and sound commands etc.

Up and ready to go

The FC-200 comes almost ready for the off, needing only a 13 amp plug. Cassette leads, TV and audio/video leads are included as standard. A nice touch is the switching unit between the TV and computer which does away with having to keep changing the leads when you want to watch the TV or vice versa.

On power up, two messages are displayed one after the other, the final one showing that out of the total 64K RAM, 28815 bytes are available to the user from BASIC.

The quality of the screen picture varied from one TV to another, the worst being on a 26 inch colour and the best on a 14 inch colour. On the former the picture was blurred around the edges and had 'fringes' to the text.

I experienced no overheating problems with the FC-200. In fact it was left running for 14 hours and was fine suggesting that it has a very efficient heat sink unit.

Supplied software

This was far from inspiring, consisting of a couple of graphics programs with background music followed by a listing of the machine's specifications. This, when viewed in the high street store would do little to attract purchasers.

However, poor as its content might be, the software loaded very easily even from a very old cassette player in very poor condition. The volume level did not appear to be critical. However, I was surprised to discover that there is no error checking during the load. If the volume is deliberately turned down during a load, the machine still prompts with 'OK' even though the program has loaded wrongly. This could be infuriating if you had loaded a 20K program!

MSX handling

Being unimpressed by the software, I turned to the supplied manual to set about writing my own graphics programs. I must just say here that the manual is not very good, particularly on the subject of defining the user programmable keys, which it didn't explain at all! However, because the graphics commands are quite simple, you can produce some very pleasant programs in a matter of minutes.

Sprite handling on the FC-200 (and I presume all other MSX machines) is a slightly more complex affair, although with little effort you can have all kinds of shapes roaming around the screen.

MSX BASIC supports all the standard Microsoft commands and also some TOOLKIT commands including RENUMBER and TRACE MERGE. By far the most useful implementation of MSX BASIC is the addition of the IF THEN. . . ELSE statement which provides the programmer with complex one liners capable of doing a whole host of things.

Peripherals

Add ons for the MSX machines will include disk drives, colour plotters, light pens, printers and cartridge software. A slot is provided for the cartridges above the cursor keys. It is protected by a spring loaded door, which I hasten to add, wipes memory clean if opened by grubby little fingers. This is obviously to protect the cartridge from being damaged by inserting it while the machine is powered up.

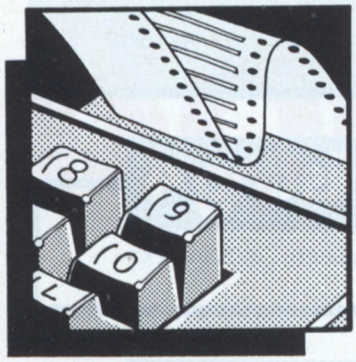
Summary

At £229, I feel the FC-200 is rather overpriced, being more of a contender for the £190-200 price range. However, for your money you do get quite a sophisticated machine. Any computer is only as good as the software support it receives and if MSX is to take off, then good software and peripherals are urgently needed. I don't doubt that some of the larger manufacturers will supply these.

In conclusion I feel that the FC-200 is quite a good machine which offers the buyer some tempting features. My advice is that you look at the MSX machines available and weigh them up against the software support and after-sales service, before paying out your money.

GOLDSTAR FC-200 SPECIFICATIONS

Processor	Z80A (3.58 MHz)
Memory	80Kbytes RAM (64K + 16K video RAM for graphics)
ROM	32K (BASIC interpreter)
Text	40 columns by 24 lines
Hi-res screen	256 x 192 dot
Low-res screen	64 block x 48 block (4x4)
Sound	3 tones, 8 octaves
Cassette	1200/2400 baud
Sprites	32 available
Colours	16 on all screens
Power	240V AC(50/60Hz)



SPECTRUM 48K

Spectrum Supercharger

Take your Spectrum into the big time league with these utility programs by Philip Crawley.

The ZX Spectrum, when released, was at the fore regarding colour, sound and HIRES. However, in its two years, and three issues, it is clear that it is lacking in some facilities now standard on its contempories.

However, with a bit of trickery some nice results are quite feasible. Type in Program 1.

This routine is useful while the rules of a game are being displayed or when a game has finished. It is vital that the code is left at lines 2-6 as the timing is very important, and if the routine is moved deeper into a program, the GOTO (at line 4) will take longer and so the effect will be lost. The BORDER values can be any valid numbers so long as the first two and last two are all equal (1 = blue in this case). Another good border effect can be achieved by changing line 4 to:

```
4 PAUSE 1: IF INKEY$ =
"" THEN GOTO 3
```

For an explosion using the border try this little routine:

```
1 FOR N=0 TO 100
2 OUT 254,254 *RND
3 NEXT N
```

Combine this with any explosion visuals your game contains and you have a good looking (and sounding!) routine. On the subject of sound, the Spectrum is often criticised. But it is possible to achieve good results particularly if you have your machine hooked up to some sort of amplifier. Program 2 plays a rhythm with one tone rising and the one falling. Programs 3 and 4 produce telephone ringing and a jingle respectively.

Since the BASIC interpreter is lacking in some aspects, several facilities may be implemented via the system variable or by calls to ROM routines as shown in Tables 1 and 2.

Getting back to the subject of borders try typing in the following line. LET T = USR XXXX where XXXX is an even number between 1310 and 1320. Try all the values as they give different colours.

Anti-piracy device

If you want to protect your software from piracy the following method works extremely well.

program listing 1

```
1 GO TO 100
2:
3 BORDER 1:BORDER 1:BORDER 6:BORDER 0:BORDER
4:BORDER
2:BORDER 3:BORDER 5:BORDER 1:BORDER 1
4 IF INKEY$="" THEN GO TO 3
5 RETURN
6:
100 REM display instructions
105 BORDER 7:PAPER 7:CLS
110 PRINT 1,10; INVERSE 1;"BORDER ROLL"
120 PRINT #1;TAB 4;FLASH 1;"PRESS ANY KEY TO
CONTINUE"
130 GO SUB 2
140:
150 REM rest of program
```

Without the use of colour cards or expensive 'dongles' it is possible to make a 48K program copyproof.

Spectrum tape software is usually made up of three distinct parts; short BASIC loader program, SCREEN$ to keep you amused while the game loads and then machine code. So, to start with lower RAMTOP, load the machine code then enter Program 5. Leave out the normal loader program. It is important that the software is fully de-bugged. Now clear the screen and load your SCREEN$. Then, making sure you don't lose the screen, type GOTO 1 and set your tape drive to record.

The principle behind the operation is as follows. No matter what the adverts state, a copier program does require some memory to run it. This may be the printer buffer or the UDG area, but no matter how devious the copier is it is in there somewhere. So if you make a file a full 48K long, it will overwrite the copier program and make it impossible to copy by software means.

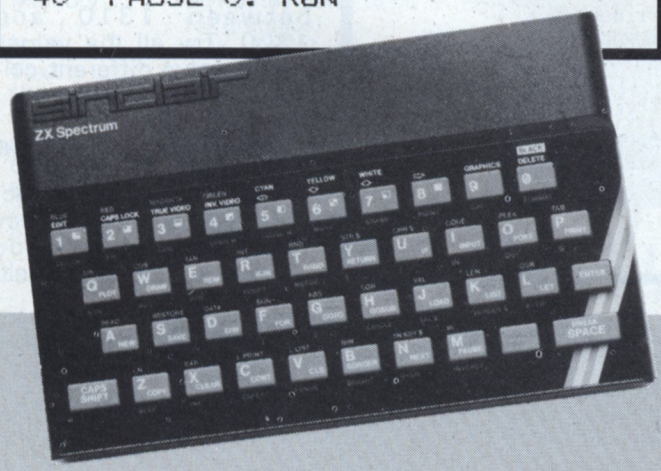
The program must be loaded by LOAD "PROG"CODE and will autorun. Also, the program is altered such that during LOADing, pressing the BREAK key will cause a system reset. Line 3 disables the LIST command so if your program is in BASIC, a measure of extra software protection is provided.

Since the whole of the memory is saved, when the program re-loads, it will take on exactly the same state as it had just after the save procedure. Line 5 disables the break key altogether so it won't crash if the BREAK key is used after loading is complete. Incidentally, if your software is written in BASIC, then Lines 1 and 6 can be omitted. They are, however, vital if your software contains machine code.

Although this method does increase loading time to five minutes, it is surely worth it when you consider that the software cannot spawn illegal copies. Do your bit for anti-piracy!

program listing 2

```
10 FOR n=0 TO 20
20  BEEP 0.01,n: BEEP 0.01,20-n
30  NEXT n
40  PAUSE 0: RUN
```



program listing 3

```
FOR a=1 TO 2:FOR b=11.6 TO 12 STEP 0.1:BEEP
.018,b:FOR d=1 TO 22:NEXT d:NEXT a:RETURN
```

program listing 4

```
FOR b=62 TO 24 STEP -6:BEEP .022,b:NEXT
b:RETURN
```

program listing 5

```
1 CLEAR XXXX:REM Your value
2 POKE 23613,0
3 POKE 23755,100
4 SAVE "PROG",CODE 16384,49152
5 POKE 23613, PEEK(23730)-5
6 RANDOMIZE USR XXXX+1
```

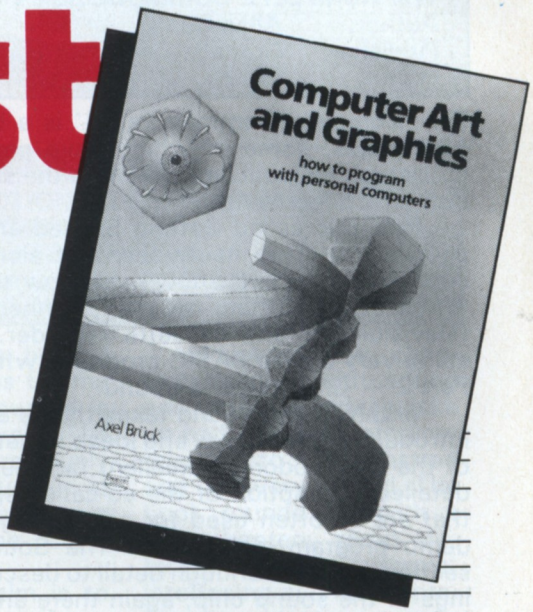
Table 1 System variables

POKE 237546,0	—	Make line zero out of line 1 — un-editable
POKE 23658,8	—	CAPS LOCK, POKE 23658,0 turns it off
POKE 23755,100	—	Disable list command, POKE 23755,0 re-enables LIST
POKE 23659,0	—	24 line screen, POKE 23659,2 before program finishes
POKE 23736,181	—	Stops the 'Start tape...etc.' prompt
POKE 23794,181	—	Same, if Interface One is fitted.
POKE 23693,56	—	Resets screen attributes
POKE 23613,	—	Disable BREAK key
PEEK (23730)-5		Reset error vector, protects
POKE 23613,0	—	program during LOAD
POKE 23692,255	—	Disable 'Scroll' prompt.

Table 2 Calls to ROM routines

LET T=USR 7997: LET T=7997-T	—	T is the number of frames before keypress
LET T=USR 3582	—	Simulates ZX81 SCROLL function
LET T=USR 3213	—	Stops and asks 'Scroll'
LET T=USR 4757	—	Prints Sinclair copyright message
LET T=65536-USR 7962	—	Number of free bytes

Book List



COMPUTER ART AND GRAPHICS (How to Program with Personal Computers)
Author: Axel Bruck
Publisher: Century Communications
Price: £14.95 (hardback)

This beautifully presented and illustrated book deals with the techniques required to produce two and three dimensional line drawings on a personal computer.

The examples given are for the Apple computer, with or without a plotter. However, the book will be of interest to owners of any home computer which can be interfaced to any printer/plotter.

The book is not for the faint hearted as it is a very detailed instructional and goes into some quite complicated maths at some points.

The drawings and full colour pictures in the book are so beautifully produced that it would be almost worth buying it for these alone. However, it is a serious, quite academic book for the professional programmer or researcher interested in the graphical representation of mathmatical shapes.

The tutorial starts with simple geometric shapes and moves onto curves and then more complicated forms. The latter half of he book is given over to 3D projections with perspective on more complicated shapes. It is a shame that hidden line and object removal was bypassed completely, apart from a passing reference that it would be covered in a later book.

Overall this is the kind of book that you might read once and then put on your shelf for reference. However, it might have more far reaching consequences. One read was enough to get me interested in the area of 3D graphics and it is always refreshing to come across a computer book that is not a simple rewrite of a computer manual, or a list of boring games.

M.R.

THE COMPLETE SPECTRUM
Author: Allan Scott
Publisher: Granada Technical Books Ltd.
Price: £9.95

The complete Spectrum is a book in which Allan Scott has brought together some previously published articles, with some ideas and comment of his own. There are sections originally written by Ian Sinclair, Steve Money, Vince Apps, Mike James, S. M. Gee and Kay Ewbank, all of which are re-represented with illustrations by Allan Scott.

The book enables the complete beginner to follow a step by step guide through basic computing techniques and programming concepts. Having completed these chapters he can then join the more experienced user in discovering Sinclair graphics, sound and machine code programming.

Each chapter is complete with working example programs which serve to highlight points being discussed and can invariably be used as modules in your own programs. These examples incidentally are reproduced in extremely legible computer printed text.

Other chapters deal with Adventure Gaming, including some very useful tips on writing your own, and Spectrum add-ons where such things as keyboards, printers, microdrives and other expansions are discussed.

A further section contains 15 program listings to key in. These range from junior educational games to more advanced and exciting games.

This book lives up to its title well, in that in a 487 page bumper single volume, basic concepts and programming tuition are covered for the beginner whilst more advanced techniques and facilities are covered for the more experienced user. Many 'tricks of the programming trade' can be learned and some useful code can be found within.

D.J.W.

Book List

THE COMPLETE COMMODORE 64
Author: **Allan Scott**
Publisher: Granada Technical Books Ltd.
Price: £9.95

The 'Complete Commodore 64' is a book of some 488 pages, some of which have previously been published, so I will deal with it in the seven sections into which it is split.

Part 1 is called Getting Started and is ideal for people who have never seen, let alone handled, a computer before. It shows you how to set up your '64, including fitting the plug, connecting it to the television set and cassette recorder. Then on to some very simple BASIC programs which leads into Part 2 — Graphics and Sound.

Graphics and Sound takes things a little further, introducing techniques and ideas to get the most out of the Commodore's excellent facilities, including a detailed description of the so-called sprite graphics that are so often used for game progams. A short demo program is included. The Sound Generator section goes into enough detail to describe the workings of the sound chip, again there are a few short demo programs to type.

Part 3 is called the Leisure Section and that is just what it is. It contains full BASIC listings of some selected fun, educational and purely practical programs. There are games for younger users, then a section for the more experienced.

The next section was of particular interest to myself — Adventures with the Commodore 64. It is an introduction to, what is to me, a fascinating and absorbing commputer art form. This section, again, supplies a complete set of tested progams into which you can fit your own adventure.

Part 5, Extending the Commodore 64, is an introduction to the enormous range of plug-in and add-on units that can turn your '64 into almost anything you want it to be. It goes from joysticks to disk-drives, from cartridges to modems and much more.

Introducing Machine Code is the next part. Machine Code is the "final frontier" of the Commodore 64 and this section just skims the surface, leaving the reader confident enough to tackle some of the more advanced text books and manuals that at that moment look like Double-Dutch.

The final section contains the appendices and here you will find a great deal of useful information, including a selection of commercially available software titles, a Hex and Denary convertor, addressing the 6502, ROM and RAM addresss and a complete index to the book.

In conclusion it is not a book for the seasoned hacker, more for the complete beginner. It will guide you from wiring up the plug to giving an insight of machine code. The contents are many and varied making it very good value for money. **A.O**

INTRODUCING THE SINCLAIR QL (THE SINCLAIR QL SERIES)
Author: Garry Marshall
Editor: Robin Bradbeer
Publisher: Hutchinson Computer Publishing Co. Ltd.
Price: £6.95

The speed at which books on the OL have appeared since its launch has been quite amazing. What is also of surprise is the number of books. There is no better example than "The Sinclair QL Series", of which there are already five titles, with at least another five hot on their heels. "Introducing the Sinclair QL' is the first in the series. If this volume demonstrates the standard, then QL owners can look forward to a useful set of books for their micro.

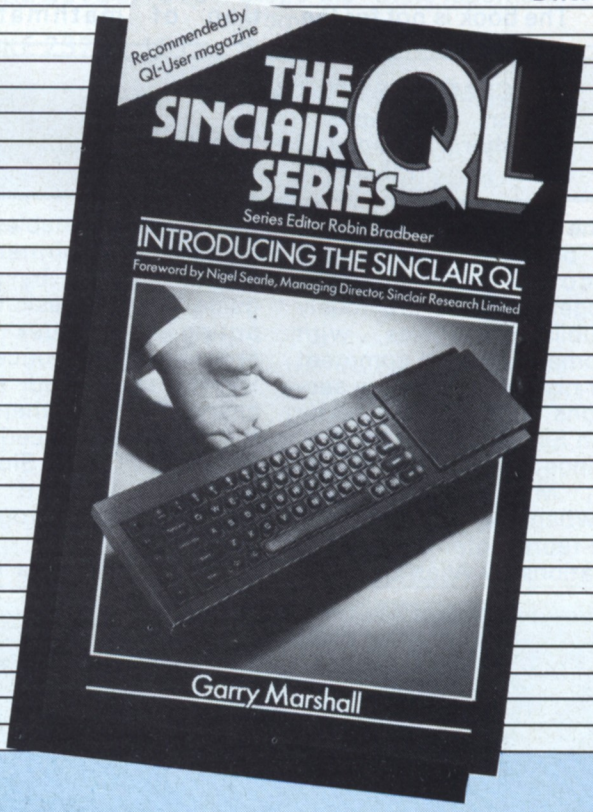
The book is aimed at both the first time user of the QL, and the complete newcomer to computing. It is written in the style of many introductory books, explaining in simple terms how, what and why, all examples referring to the QL of course.

The complete newcomer might find the book a little heavy going at first, as the most basic aspects are not clearly explained.

The book covers most of what the newcomer would want. How to get started, what all the 'holes' at the back do etc. The purpose and applications of the four Psion business packages are described, without going into how to operate these systems. I felt it was inappropriate to include in this book a large section on SuperBASIC keywords. This section (amounting to a third of the book) appears quite similar to the keywords section of the manual, and more appropriate to the book on BASIC in the series (which also has this section!)

This is an excellent book for the newcomer to computing, but anyone moving to the QL with experience of another micro may find it too simple.

D.N.



ADVENTURE GAMES FOR THE COMMODORE 64
Author: A.J.Bradbury
Publisher: Granada Technical Books Ltd.
Price: £6.95

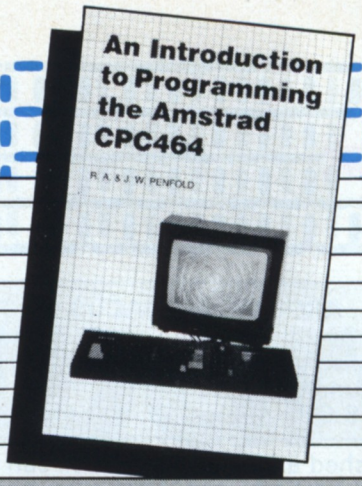
Books on adventures abound and they are very much the same. All give some brief account of the nature of adventures, how to design them, array handling, map making, decoding text input and giving messages. This should not be very surprising because the essence of adventure design is database manipulation and so all books on adventures boil down to this.

The differences between such books depend on how much attention they give to programming, whether they deal with the dungeons and dragons type combat adventure, the style of writing and the number of complete listings included.

Programming is the main topic of this book, and is good, being well presented with useful and helpful examples. One aspect that is not found in many such books is text compression, important in any large adventure. This book provides you with a complete and useful, if slightly tedious, method and, if you are looking for a way to save memory in your adventures it may be worth its price just for this.

Some attention is paid to random and combat elements, but not as much as some adventurers would like. There is a little that is original about it, but it is solid introductory material. This is in accord with the general tone and style which bends over backwards to be user friendly, helpful and chatty and teeming with examples, but which consequently makes it a little uninspiring at times.

As for listings, there is one complete adventure which is mediocre, but not very original, slightly humorous and not fully corrected. More useful will be many of the sample routines which can easily be adapted for other programs. In short this is a little better than many of the current adventure books, but does not really stand out from the crowd. **N.W.**



AN INTRODUCTION TO PROGRAMMING THE AMSTRAD CPC464
Author: R.A. & J.W. Penfold
Publisher: Bernard Babini (Publishing Ltd)
Price: £2.25

This is the first book I have come across for the Amstrad and as such it is bound to sell well. The authors have previously written quite a number of computer books on a variety of home computers.

The book's aim is to complement the Amstrad's manual rather than duplicate it and to some extent it manages to do this. Each chapter deals with various aspects of BASIC programming and is illustrated with simple examples to clarify the points raised. In the first few chapters the points covered are fairly straightforward and relate mostly to programming in general and not just the Amstrad. As such they will only really be of interest to beginners.

However, the chapters dealing with sound and graphics, which take up half the book, are very relevant to the Amstrad and also very helpful. The book rounds off with a few chapters about different number systems, interfacing and interrupts. These subjects are only treated at a superficial level and you would have to read elsewhere if you wish to find out more about them. The book is generally error free and those few errors present are trivial and should cause no problems.

At only £2.25 for 125 pages the book is reasonably priced. If you are a novice or need help with your sound or graphic techniques then I would recommend it.

S.C.

ARTIFICIAL INTELLIGENCE IN BASIC
Author: Mike James
Publisher: Newnes Microcomputer Books
Butterworth & Co.
Price: £5.95

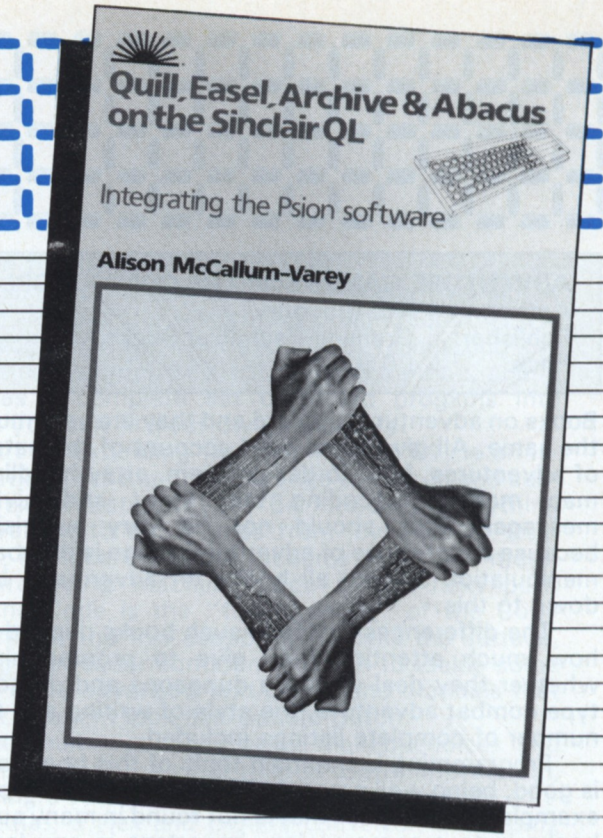
The only real complaint I have about this book is the title! It's not really about achieving artificial intelligence in BASIC, but it does do a fairly decent job of introducing BASIC users to some of the techniques which underly the subject. Perphaps "Artificial Intelligence Tools in BASIC" would have been more appropriate.

BASIC is rather primitive as languages go, yet AI is a very sophisticated topic. The book is therefore limited to presenting actual programs of only the simplest algorithms, discussing more advanced ones afterwards. A lot of the AI is quite old hat and has been superseded by newer, more complex methods, but given that most readers won't know anything at all about AI when they first pick up the book, that's probably a good thing. Still, it would have been nice to have had some sort of brief mention of later ideas, if not current ones.

All in all, "Artificial Intelligence in BASIC" is a reasonably competant introduction to AI, which given the miserably weak content of most publications of this kind, is quite a complement! Anyone wishing to learn some of the easiest parts of AI without straining their brain too much (Mike James' style is very readable), could do worse than buy this book. Anyone thinking more seriously about AI would probably be better off without it.

R.B.

Book List



QUILL, EASEL, ARCHIVE, & ABACUS ON THE SINCLAIR QL
Author: Alison McCallum-Varey
Publisher: Sunshine Books
Price: £6.95

The obviously rushed and confusing documentation supplied with the excellent Psion integrated business software for the QL will, no doubt, spawn several books attempting to explain these programs more clearly. The first of these is a book from Sunshine Publications. Despite the speed of its appearance, it has been carefully considered, with few obvious examples of a 'rush job'.

In reviewing any book of this sort, the obvious question to be asked is — will it provide anything in addition to the documentation supplied with the computer? While it contains no additional factual information, the book should enable users to understand more readily how to operate the Psion software.

The book can be divided into two parts. The first half contains a review of the elements. This, in other words, is a simplified explanation of how to operate the four packages in isolation from each other. This section takes you stepwise through a number of examples. At the end of this, readers should have a basic understanding of the operation of each program.

There are many aspects of the packages which are left untouched in this section, so re-reading of the QL documentation will be necessary for full awareness of the power of each system. However, that job is made easier by first reading the book's simplified introduction.

Where the book really scores over the QL documentation is in the second section on integrating the packages. Following the same style, you are taken through a series of examples which show you how to transfer data from one package to another. You are also shown some of the pitfalls to avoid.

No doubt books on the same subject will appear which will, in the light of longer experience by the author, be able to offer even more advice. But, if you want to extend your Psion software to the limits of current knowledge, you probably could not at the moment find a better book than this.

D.N.

GETTING THE MOST FROM YOUR ORIC
Editor: Bryan Skinner
Publisher: Penguin Books Ltd.
Price: £5.95

The blurb on the back cover of the book states quite grandly that "all aspects of programming are covered in comprehensive detail". How modest!

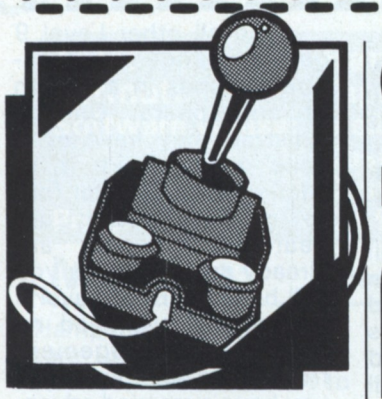
That presumptuous statement apart, it is actually quite a good book, covering both ROM versions and aimed primarily at the beginner although many experienced Oric users will find plenty to keep them interested. The terminology is kept as 'user friendly' as possible with the first chapters gently weaning the newcomer into the brave new world of computer programming. Once he or she has grasped the intricacies of binary mathemetics, electronic gate circuitry, the internal functioning of the Oric and where to plug in the aerial lead, the newcomer is shown the fundamentals of the BASIC language.

Although the author explains some of the more important BASIC instructions in detail he prefers to demonstrate the power of BASIC through lots of example programs. In some instances, as with the sort routines, the programs are introduced complete and their functions analysed in detail. Elsewhere, as with the 'bat/ball' program, quite complex code is carefully built up in simple logical stages with a thorough explanation of each stage.

As well as the introduction to BASIC the book also contains excellent chapters on sound, graphics, debugging, speeding up programs and how to cure the bugs in the old ROM along with some quite useful appendices.

Probably because the book is aimed at beginners there is no machine code section and only very little explanation of the 'CALL' and 'USR' functions. It's a shame really, since after more than eighteen months in existence the workings of the Oric ROM should be far more freely available to Oric owners (irrespective of whatever arrangements exist with Tansoft). However, I shouldn't blame the author for that. My only other complaint is the lack of an index which can be infuriating at times.

Overall this is a thorough introduction to computing on the Oric which most beginners should find excellent value for money. **D.H.**



Software Reviews

REVIEWS

Title:	**Graphics Editor**
Format:	**Tape**
Software House:	**Romik Software Ltd, 272 Argyll Avenue, Slough SL1 4HE.**
Price:	**£14.99**
Machine:	**CBM 64**

Not another Graphics Editor for the 64 I hear you moan! Well this package from Romik is certainly worth looking into even if you already possess such an animal in your collection.

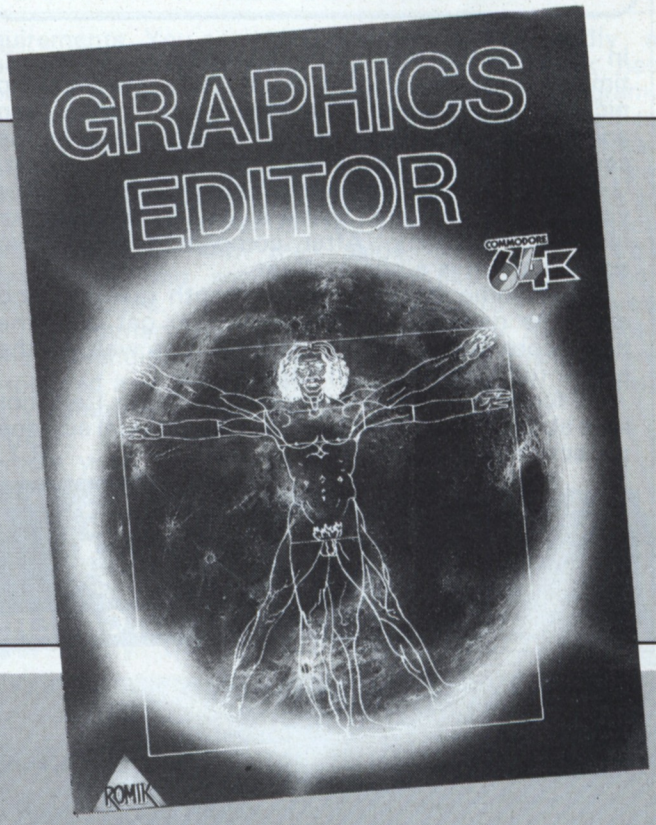
The package itself consists of three independent editors all called from a primary menu. These are (a) character and (b) sprite and (c) screen editor. The character and sprite editors are what you would expect allowing you to define new character sets and to define up to 64 different sprite images. Facilities are provided to plot, unplot, invert, mirror, rotate etc. to your hearts content. The screen editor allows you to compose screens using your newly defined characters and some quite good effects can be produced using this facility alone.

What impressed me about this package was the animation facility. This allows you to build up to 16 frames, each frame consisting of a 2x2 grid of sprites, and allows you to view successive frames at varying speeds to produce cartoon style animation

The documentation is both clear and concise. The package itself is very easy to use with good use being made of colours. A nice touch would have been to include some demonstration programs because I'm sure some very good effects are possible.

Overall an excellent, well produced utility. If you do not already possess an editor and are thinking of buying one then I thoroughly recommend you add this to your list. I found it useful (and I already have one!).

STAR TABLE	
Screen display	* * * * *
Usefulness	* * * * *
Ease of use	* * * * *
Overall	100%



Title: Dungeon Adventure
Format: Tape
Software House: Level 9, 229 Hughenden Road, High Wycombe, Bucks., HP13 5PG
Price: £9.90
Machine: Amstrad CPC464

Level 9 have now converted their adventures to run on the Amstrad, a fact which will be much appreciated by Amstrad adventurers.

Dungeon Adventure completes the Middle Earth trilogy of adventures from Level 9. The other two being Colossal Adventure and Adventure Quest. However you can play Dungeon Adventure without having played either of the others.

On entering Dungeon Adventure you will find yourself in a whole new world populated by the weird and wonderful. The denizens range from the usual giants, skeletons, dwarves and dragons to the unusual, including a grotesque bloated yellow bird with big ears! There are no graphics which is just as well as they could only detract from the images the descriptions conjure up.

This adventure, like all other Level 9 games has the facility to save and restore games, which is something that you need to do frequently. You will not solve this adventure at one or two sittings. Past experience has shown me that two or three months of adventuring is required to achieve success. Death will occur frequently which is why the save/restore feature is essential.

Like all other Level 9 games, Dungeon Adventure abounds in a wealth of atmosphere. On the Amstrad they have even gone to the extent of altering the character font to give a gothic appearance. If you are already an adventurer you will have heard of Level 9 before and will need no further encouragement from me to get involved. If you have ever tried adventuring you will not find a better way to start than with Level 9. **S.C.**

STAR TABLE	
Screen display	N/A
Addictiveness	* * * * *
Ease of use	* * * * *
Overall	100%

Title: Copter Capers
Format: Tape
Software House: A & F Software, Unit 8, Canalside Industrial Estate, Woodbine Street East, Rochdale, Lancashire, OL16 5LB
Price: £7.95
Machine: BBC 32K

In this game you pilot a modern helicopter, timewarped to the second World War. Your aim is to pick up the shipwrecked mariners out of the ocean and put them on a ship, part of which shows on the screen. However, life is not easy as there are Nazi U-boats, airships and even Nazi helicopters after you. Do not buy this game if you are looking for historical accuracy. After completing every two screens there is a bonus sheet.

The game features good smooth graphics and even the national anthem when you get onto the high score table, and you deserve it as well, as the action really heats up on latter levels.

I found it enjoyable to play, although I am not sure about its lasting appeal, as after several screens the action becomes impossibly quick. **P.T.**

STAR TABLE	
Screen display	* * * *
Addictiveness	* * * *
Ease of use	* * *
Overall	75%

Title: Rapscallion
Format: Tape
Software House: BugByte Ltd, Mulberry House, Canning Place, Liverpool.
Price: £6.95
Machine: Spectrum 48K

Once upon a time you were a happy King all snug and warm in your fine castle. Then one day along came Rapscallion the rogue and threw you into your own dungeon, (you wimp). Fear not, a fairy princess will come to your aid and grant you six lives, but only in the forms of a bird and a fly (serves you right). You can transform into either one, but will lose a life on doing so.

Your re-conquest begins in the Wilderness where you must obtain the key to the magic Labyrinth, which is the second section. From here it is only a short step to the castle — well, several short flaps actually — providing you have the magic eye and the help of the Wizards (try asking when they're resting). Thence to dispose of Rapscallion, after you get your hands (sorry feet) on the magic wand that is.

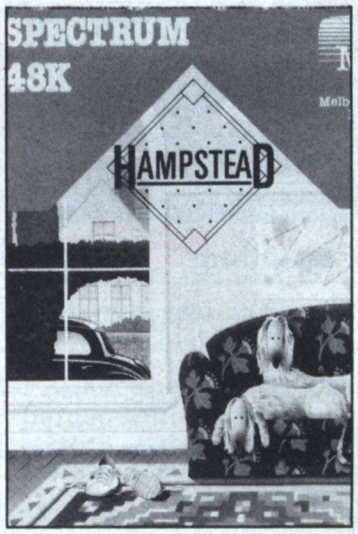
The game can be saved at any stage, but this means you only obtain a leasehold on the deeds, whereas a full runthrough gives you the freehold and worth all the effort it is too!!!

STAR TABLE	
Screen display	* * * *
Addictiveness	* * * *
Ease of use	* * * *
Overall	80%

Title: Hampstead
Format: Tape
Software House: Melbourne House, Castle Yard House, Castle Yard, Richmond
Price: £9.95
Machine: Spectrum 48K

Hampstead is an adventure game with a difference. The aim is not to collect treasure or make money as such, but to move up the social hierarchy to attain the ultimate position of being a Hampstead person.

The writers of this game have a slightly quirky sense of humour and a lot of wit which lifts this game above others, making it very funny to play. For instance on the back of the accompanying booklet there is a picture of them wearing tea cosies on their heads — perhaps this is what happens when one joins the ranks of the Hampstead dwellers!



As adventure games go, they usually fail to interest me but this one had something special about it and I am determined to finish it. My only complaint is the high price!

P.T.

STAR TABLE	
Screen display	* * * *
Addictiveness	* * * *
Ease of use	* * * *
Overall	80%

Title: Hyperaction
Format: Tape
Software House: Silversoft, London Hse, Kings Street, London
Price: £5.95
Machine: Spectrum 48K

Hyperaction is a mix of Pengo and Pacman, although this varies from sheet to sheet. In the game itself you control an insect and move it around a randomly generated maze, pick all four of the bonus characters then return to the centre of the screen to move on to the next level.

Not all the levels follow this format though and in several you must colour in the entire screen, similar to Painter. In most screens you can push the maze walls to trap the mandatory chasers, unfortunately you cannot crush them. So far I have only reached level 5, each requiring a different strategy and following a different set of rules.

The graphics are attractive, being well defined, fast and there are no attribute problems. As well as clever use of sound and several thoughtful touches this all builds up into one of the most challenging arcade games I have seen for a long time.

P.T.

STAR TABLE	
Screen display	* * * * *
Addictiveness	* * * *
Ease of use	* * * *
Overall	95%

Title: Home budget
Format: Tape
Software House: Amsoft, Brentwood House, 169 Kings Road, Brentwood, Essex CM14 4EF
Price: £19.95
Machine: Amstrad CPC464

This utility is designed to help you balance your household budget and according to Amstrad's brochure is supplied with a program cassette, data cassette and full instructions in a ringbinder. However, for the purpose of this review all I had was the program cassette. The step-by-step instructions within the program and the 'help' facility available at most stages proved invaluable and showed how easy it is to use the package.

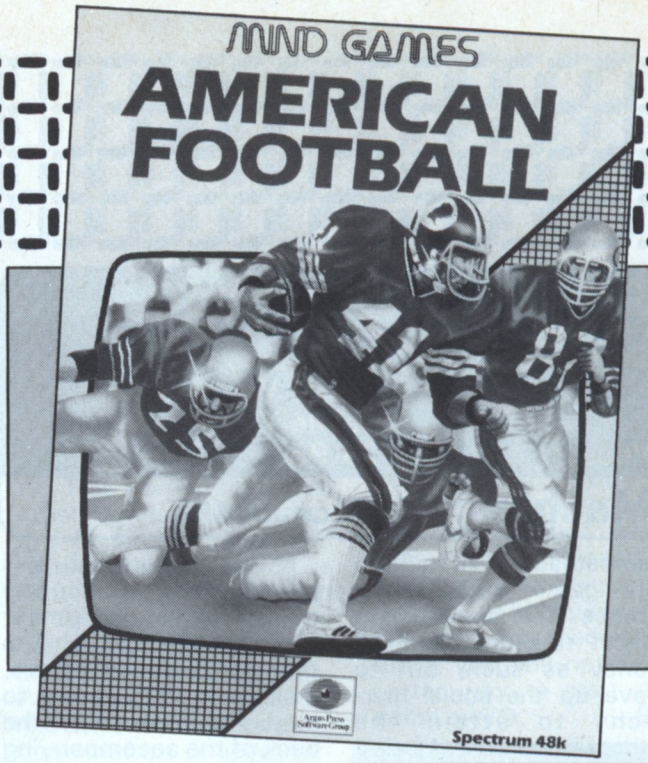
Under expenditure and income you are given a list of items such as mortgage, insurance etc. which you can tailor to suit your own requirements. You can then begin to set up your budget for the year. This can start from any month within the year and you may change or overwrite data previously input. Once set up data can be saved to tape with the date, time and security code included.

A summary of income and expenditure may be produced as a three monthly summary or as a bar chart covering the whole year. Output may be to your printer. Throughout the time you use the program you are guided by friendly user prompts.

My only misgivings are firstly the price, though undoubtedly a great deal of work has gone into this program. Secondly I would liked to have seen items expressed as a percentage of expenditure or income i.e. in pi chart format. These aside, if you think you would like to use your Amstrad to help you manage your household budget then this is a very good package.

S.C

STAR TABLE	
Screen display	* * * * *
Usefulness	* * * *
Ease of use	* * * * *
Overall	95%



Title: American Football
Format: Tape
Software House: Concept Software for Argus Press Software
Price: £9.95

Machine: 48K Spectrum

If you have the ball, then you are on the offensive and can choose one of eleven strategies. The defending team has four. The teams move intricately on the screen, the man with the ball rapidly flashing white. What gives the game interest is the intelligent randomizing parameters that have been built in. I began to feel at one stage that the "pocket" play (a medium length forward pass) was so reliable it was ruining the game. Later, when I had been intercepted about four times, I realised this was just a realistic ebb and flow of luck.

The player's movements are a little stereotyped, as you would expect on the Spectrum. Nevertheless, a very professional piece of software and great fun to play. There is a full leaflet for anyone who does not know American Football rules. **T.R.W.**

STAR TABLE	
Screen display	* * * * *
Addictiveness	* * *
Ease of use	* * * * *
Overall	85%

Title: Star Avengers
Format: Tape
Software House: Kuma Computers Ltd., 12 Horseshoe Park, Pangbourne, Berks
Price: £6.95

Machine: Amstrad CPC464

When a new machine is released, the first software tends to fall into one of two types. Either they are hastily produced, although with an original content, and fail to do justice at all to the machine, or they tend to be versions of tried and tested programs, where the programmer's efforts have been devoted to showing the new attributes to be seen in the machine.

This tape is of the second kind, and an excellent version of the arcade game 'Scramble'. I originally played Penetrator on my Spectrum, and it seemed quite fair at the time. Then, when I had an Electron, I was more impressed with the speed than on the Spectrum. This program, however, leaves both those standing! It is perhaps only just passable in certain areas, for instance having no fuel gauge or refuelling stages. However, there are areas in which it excels, chiefly in th superb use of colours. Sixteen colours may be used at any time from the palette of 27 and the change between colours is well-nigh instantaneous.

The sideways scrolling is also quite faultless, and this makes it an easy game to watch for a time. The key responses are rapid and definite, although I did find the actual keys a slightly odd choice. I would have welcomed a chance to change the selection.

However, the programmer, S. Wallis, has fitted a range of 10 different starting points into the memory, so that the player may practice on any required section. If no-one plays for a while, the program drops into demo mode, and it is a fast and furious demo! Sound is adequate and of course the Amstrad has its own volume control, so it may be turned off as required.

If you've just bought one of these fine machines, and you want to see what it can do, you could do a lot worse than to buy this tape. **P.T.**

STAR TABLE	
Screen display	* * * * *
Addictiveness	* * * *
Ease of use	* * * *
Overall	85%

R&R Competition Results

R & R Software

100 lucky readers have won themselves a copy of 'Titanic'. See if you're in with the chance by checking your answers against the correct ones!

Well the competition is over and for those hundreds of you who sent in entries, here are the correct answers to put you out of your misery.

This competition, run in conjunction with the successful software house of R and R, brought in hundreds of entries. The first one hundred correct answers drawn out of the pile will receive a copy of an exciting underwater thriller, Titanic. These winners will be notified by post.

The answers.....

1. Name three Japanese manufacturers who are producing MSX computers for the U.K. market.
Answers could have been any of...
Canon, Goldstar, Hitachi, JVC, Mitsubishi, Panasonic, Philips, Sanyo, Sony, Toshiba, Yamaha.
2. Name the presenters of Thames T.V.'s Database program.
Jane Ashton, Mike Thorne, Tony Bastable.
3. In what year did the sinking of the Titanic take place.
1912.
4. What is the name of the computer manufactured by Ferranti?
Advance 86 A/B.
5. Which Building Society offers a videotext service to its members?
Nottingham.

Whilst on the subject

While we're talking about R & R Software you might be interested to hear of the latest happenings down at their headquarters in rural Gloucester.

Recently the company has concentrated on its highly successful Titanic adventure but, as with many software houses today, it is about to unleash a new product to take the Christmas market by storm! Again, the company is spurning quantity in favour of quality and only plans to release one major program at this time in the belief that computer owners would rather have one really good program than several bad ones.

Imagine that!

The game in question has a unique feature which the company are terming 'anti-obsolescence'. They claim that their games will never become dated since every so often an update will be produced and owners can return their copy and receive the new version without cost. Gone are the days when on completion of an adventure, you might as well throw the game away!

R & R's new game is called 'Just Imagine' and is for the Spectrum 48K. It takes its theme from the sad demise of Britain's most innovative software house, Imagine. It is a very realistic simulation of running a software house and involves licensing games, watching them rise through the charts, selling, advertising, packaging etc. What's more, piracy is rampant throughout the game, which has been included to highlight the destructive effect this has in real life. Light relief is provided since the game is written as a spoof on the software industry.

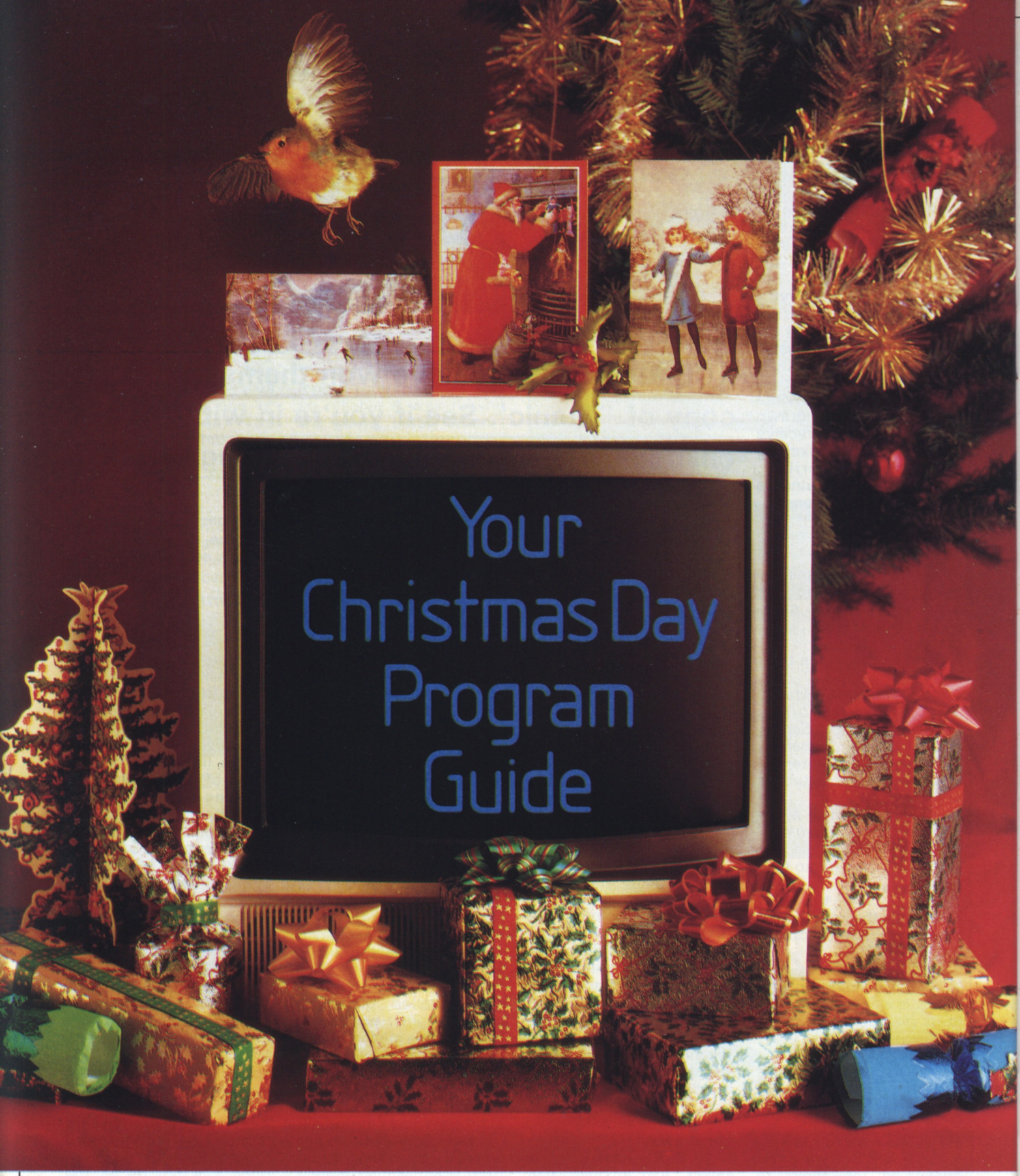
Most games of this nature are either devoid of graphics (British Lowland by CCS) or go to the other extreme and are nothing but. Managing Director, Bob Brenchley, explained that in any game one has to decide on the balance between a detailed game and detailed graphics. Just Imagine seems to have hit this ideal state by containing some excellent moving graphic screens while economising on the memory used to leave plenty of room for details.

Bob Brenchley is not worried by competition from other similar games such as Millionaire by Incentive Software because due to the humour and details included in Just Imagine, they have very little in common.

Amstrad alliance

R & R's other new developments concern the Amstrad CPC464, which Bob Brenchley sees as being the next bestseller. Their plans are still 'confidential' but it seems likely that conversions of Titanic and Just Imagine will be seen shortly.

As for the MSX machines, Bob had to say this "No way! After a few months, people will begin to realise the impracticalities of the so-called software standard. The machines are all so similar that as soon as software houses master the individual quirks of each, the programs making use of these slight differences will begin to appear and these will only be any good on the machine they were written for. The 'standard' is therefore farcial. Sure, some programs will run on all the machines but users will want more than the very simple things that these will have to be!"



Acornsoft announce tidings of great joy for both BBC Micro and Electron owners: eight brand new programs for Christmas.

Each one makes an ideal stocking filler.

They're all available at your local Acorn stockist. (To find out where that is, simply call 01-200 0200.) Or you can send off for our catalogue and order through the post by writing to Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Tel: 0933 79300.

Alternatively, however, you could always take a chance and drop a line to Father Christmas.

ACORNSOFT
Software for the BBC Micro and Electron.

9.00 Firebug

A fast moving arcade-type game in which you are a fireman, trying to rescue some oil drums and take them to the safety of a water tank. Your opponent is the firebug who runs around lighting fires which move slowly towards the drums and fire extinguishers, destroying them if contact is made.

10.00 Maze

A gripping graphics game where you enter a top secret installation with the aim of stealing secrets from a rival company. The security system, however, has many levels each consisting of a maze of corridors patrolled by armed robot guards. Complete with full colour 3-D graphics, sound effects and a high score table.

12.00 Elite

A superb 3-dimensional graphics game that's light years ahead of any other. You are a space trader who roams the universe, making your living from buying and selling cargo in your Cobra space craft. On your travels, you will encounter aggressors who are eager to put an end to your dealings. Be warned, only the fittest will survive.

1.00 Crazy Tracer

A crazy adventure in which you guide a paint roller round the edge of a maze of rectangles, while avoiding the monsters which are trying to stop you by crushing the roller. Beware – as the game progresses, so the number of monsters chasing you will increase.

3.00 Go

'Go' is a board game for two players which originated in China 3000 years ago and is now more popular than Chess in the Far East. It requires strategic insight, intuition and a strong, calculating mind. If you wish, you can also challenge the computer at differing degrees of difficulty. A velly good game indeed.

4.00 Watch Your Weight

At last, a weight-loss program designed especially for you. With it, your computer becomes an expert wholly conversant with and sympathetic to your needs, and will help you choose an appropriate and individual weight-loss plan. The program also includes a calorie counter and a series of apposite menu suggestions to help stimulate your imagination when you just can't think what to eat.

5.00 The Complete Cocktail Maker

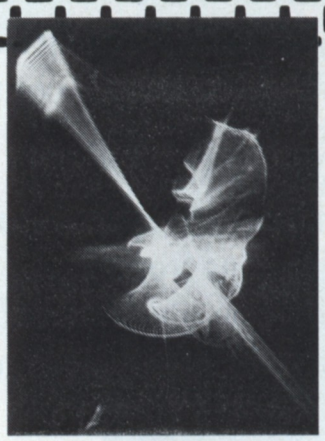
With everything from a Black Russian to a Betsy Ross, this program contains data sufficient to concoct a staggering 320 different cocktails.

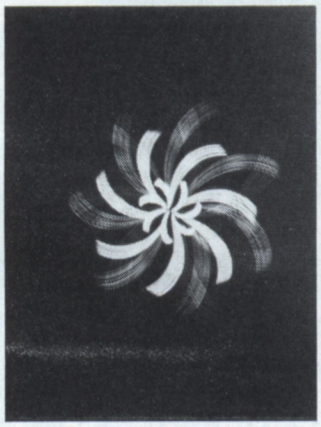
6.00 Paul Daniels' Magic Show

Stun and amaze your friends with your astounding feats of magic. This program contains ten tricks to be performed by or with your BBC Micro/Electron. Hurry though – it's bound to disappear fast.

Sensing the Light Fantastic

A new form of entertainment is making its mark in our capital city. Jane Price has been investigating the evening dress of the London Planetarium.





Examples of the images used in the show.

There are no problems in seeing the screen at the London Planetarium — the show is on the ceiling! The domed roof of the auditorium provides the ideal setting for a display of breathtaking multi-coloured pulsating images which together with 2000 watts of sound blasting out of speakers forms the Laser Light Show.

As twilight falls, the Planetarium, owned by Madame Tussauds, sheds its daytime sobriety to become the Laserium, the only one of its kind in Europe. Inside the dimmed theatre, audiences of mixed age and nationality are transported into a world of light and sound.

A Laserium show is about an hour long and the music is chosen for its ability to create emotions or impressions which can be mirrored by the lighting effects. Such effects represent the pinnacle of laser technology and are produced by equipment costing thousands of pounds. You won't see anything like it elsewhere in Europe.

The idea of laser light shows was originated by an American, Ivan Dryer. In 1970 he tried to film some laser effects but noticing that the extraordinary quality of the light could not be captured by this medium, decided to develop a live show. That decision was followed by the excellent idea of using a planetarium as the 'stage'. Such a building is ideal with its huge domed roof, reclining seats and batteries of special effects projectors. The first 'Laserium' light concerts were given in the planetarium of the Griffith Observatory in Los Angeles in 1973 and since then advances in technology have been incorporated into their production to give the stunning effects we see today.

So what's a laser?

Despite the aura which surrounds them, lasers aren't really that complex. L.A.S.E.R. stands for Light Amplification by the Stimulated Emission of Radiation. their operation can be broken down into two parts: generation of light and organisation of it to give the special properties.

At the heart of the Laserium's laser is a tube of krypton gas, the atoms of which are stimulated by an external force, in this case an electrical discharge. The atoms absorb the energy, putting the electrons which are orbitting them into a higher state of 'excitement'. The atoms become unstable in this form, so the electrons fall back to their original state, releasing their extra energy as they do so in the form of a small packet of light called a photon. Because krypton gas is pure, all the emitted photons have the same wavelength and this accounts for the strong single colour of the laser.

A laser beam is made up of millions of photons and to produce these, the reaction must be maintained. Luckily, the laser takes care of this itself. When an atom falls back to its steady state it emits several photons, some of which will collide with other atoms raising them to an excited state. When they fall back, more photons are generated and the process continues.

The next problem to solve is how to organise this unruly bunch of excited photons into a coherent beam. You can't let all the photons out because the chain reaction would collapse, but you can't keep them all in because a beam is required.

This is solved by placing a full mirror at one end of the laser tube and a half silvered mirror at the other. These reflect enough photons to keep the reaction going while

letting enough escape to form the beam. Because the photons which make it to the outside have been travelling parallel to the axis of the tube, the beam itself stays parallel on leaving it. In fact a laser beam spreads so little that you could fire it at the moon and still be able to detect it when it bounces back a few seconds later.

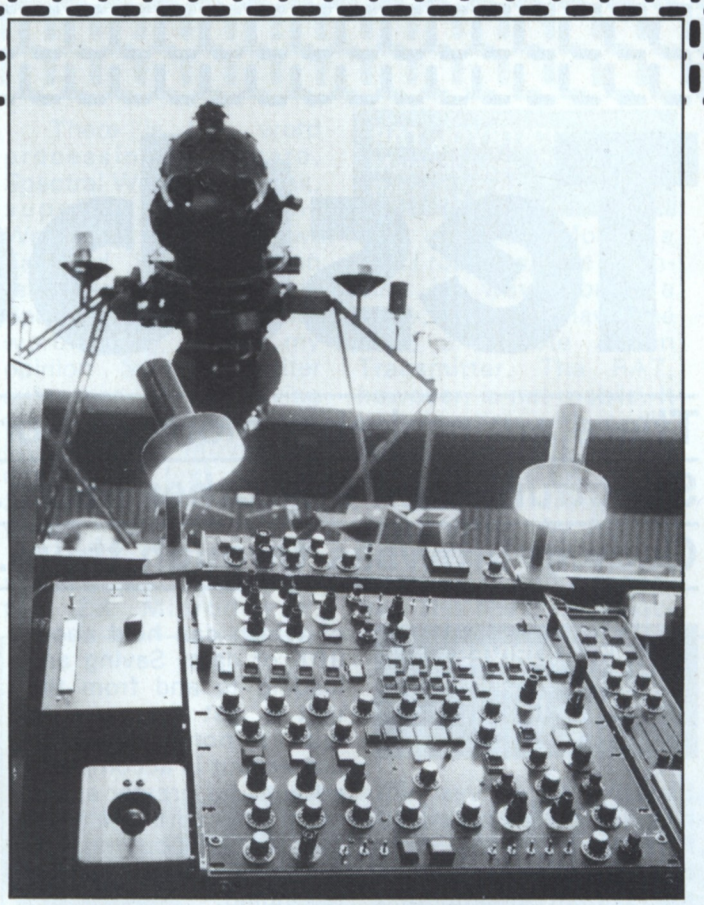
Into action

So that is how the beam is produced, now let's see what's done with it. The concentrated ribbon of light is projected onto the centre of the Planetarium's domed roof. It can be split into its four constituent colours, the basic palette with which the laser 'artist' works to produce multi-coloured abstract shapes.

Each coloured beam is moved by two oscillating mirrors (giving horizontal and vertical movement). A shape can be made by individual colours or by all of them together, the beams moving so quickly that the eye is tricked into seeing a solid shape rather than a furiously moving pin prick of light. Complicated shapes can be built up by changing the speed and direction of oscillation in a way similar to that in which a musical note is produced by a synthesiser.

There are several sets of oscillators which can be set up in advance, so that while one image is being produced, the next one can be set up and so on. There is also a small computer storing data for previously drawn images or for text.

The beams can be modified by shining them through various 'glasses', which work as filters softening or diffusing the beam. They can also multiply the image so that it is repeated all over the dome. In this way, a whole bank of patterns, moving or stationary can be produced. The Laserium laser projector has about twenty of these 'glasses' and the resultant images can be called on at any time by the laserist. They can be used to produce background effects while an image of a solo figure can be projected in the foreground.



The operations console.

On with the Show

The laser beam is controlled from a panel in the auditorium by the laserist, Mark Sutton-Vane, who is responsible for the live elements of the show. In front of him are the many oscillators which are capable, with manipulation, of making circles, lines or squares in any frequency, size or colour. Mark learns the combination of oscillators which will give him the shapes he wants and 'stores' a vocabulary of sequences in his head in the same way that a musician remembers chords and rhythms.

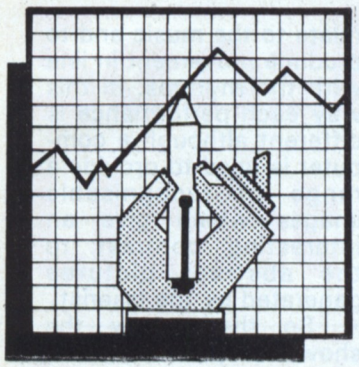
The basic programme of each show is designed and choreographed by Ivan Dryer's company, Laser Images, in L.A. where the music and computer data for the basic background images are laid down on magnetic tape. Copies of these tapes are sent to planetaria around the world presenting the shows. The laserist then interprets and 'performs' the shows live. He must be able to generate abstract images which relate to the music and to produce movement in line with the rhythms. In this way each performance is different although a computer is used to provide a range of recognisable images which give an interesting contrast to the abstract pictures generated by the laserist.

So that's how the show is produced but what of the atmosphere? At the moment, the Laserium is presenting two shows on different nights of the week. I saw 'Rush' which is a presentation of music by the group of the same name. Not really my cup of tea but the hour spent cossetted in the relaxing surroundings of the auditorium was very enjoyable. The light effects are truly amazing, transporting the audience into a whole new world of light and sound.

There is no typical audience. Every performance is different both in terms of presentation and the people experiencing it. Ages range from five years up to ninety but it is always an international gathering since the shows are high on the list of tourist priorities. Nothing like it exists anywhere else in Europe! The late night shows are the liveliest with young people from all over the world enjoying an hour of total escape from the realities of their lives.

PCT would like to thank Madame Tussauds for their help with this article, in particular Mark Sutton-Vane, the laserist.

Details about the Laser Light Shows are available from Madame Tussauds on 01-486 2242.



Testbed

There are probably more add-ons for the Spectrum than any other micro. Simon Godwin browses through them.

ADD-ONS

ZX MICRODRIVES
Manufacturer: Sinclair Research Ltd.
Price: £49.95

Sinclair Microdrives are high speed floppy drives for use with the ZX Spectrum and are identical to the system incorporated into the Sinclair QL.

The ZX Microdrives must be used in conjuction with the Interface 1 and if you don't already own this unit, the total cost of the system is boosted to £99.90, although currently you can buy the Sinclair 'ZX Spectrum Expansion System', which includes a Microdrive, Interface 1, five programs on cartridge and one blank cartridge for only £99.95.

The Interface 1 is necessary to add the extra commands for loading, saving, verifying, formatting and cataloging to Spectrum BASIC and also has RS232 and local area network Interfaces to link up the Spectrum to the outside world via printer and other computers.

The Microdrive unit is a box about the size of a travel clock. It has an aperture in the front to accept the cartridges, each of which can hold about 90K of data. Saving and loading to and from the unit is just the same as with a normal cassette player, but is accomplished with far greater speed since the cartridge is a continuous loop of tape which doesn't need rewinding.

One thing that takes some getting used to is the long command structure which has been adopted. The normal 'LOAD ''name'' ' is replaced with 'LOAD* ''M'';n;''name'' where ''M'' is the Microdrive and ''n'' is the drive number, there being the possibility of having up to eight Microdrives connected at once.

Even though the Microdrive has been out for over a year, it has failed to interest the software houses into producing programs in the cartridge format. To partly remedy this there are programs on the market which will transfer most commercial software from tape to Microdrive cartridge.

I have been using my Microdrives for over a year and have found them to be very reliable, having only lost two files in this

time. Since Spectrum owners have little choice of floppy disk drives, the Microdrives provide the best alternative to the cassette recorder and the Expansion Pack, which includes the Tasword Two word processing software, Masterfile and two games from Quicksilva, is very good value for money.

WAFADRIVE
Manufacturer: Rotronics
Price: £129.95

There is now competition to the ZX Microdrives in the form of this unit. There are two drives built into it making the system quite large. The 'wafers' are about twice as wide as the Sinclair cartridges and come in three capacities: 16K, 64K and 128K.

Operaton is much easier on the Wafadrive than the Microdrive as the syntax of commands is the same as with tapes except that an asterisk is placed after the command and an optional file number inserted before the filename. The catalogue facility is much nicer than the one on the Microdrive, having more detail and a better layout.

The Wafadrive also has a feature sadly lacking in the Microdrives. This is a wildcard facility which allows movement or erasure of multiple files in one go. For example, 'MOVE* a:sk*'' TO ''b:'' will copy all files starting with ''sk'' from drive A to drive B.

The drive also has two interfaces built in. Centronics and RS232. The former connects to printer and the latter to printers, modems, other computers or anything else with an RS232 interface.

There is free word processing software, Spectral Writer by Softek, supplied with the Wafadrive. Up to now, Tasword Two has been regarded as the only Spectrum word processor worth using, but in my opinion Spectral Writer surpasses it by giving tabs, improved character set, faster movement around the text and an almost instant search facility.

The equivalent system built up around the ZX Microdrives, (Spectrum Expansion System, second drive and Centronics interface) would cost you about £200, so the Wafadrive system offers a saving of around £70. My only reservation about the Rotronics system is that it is noticeably slower than the Microdrives and waiting for a program to load on the 128K wafer is rather painful! Also no software houses are producing programs in this format.

RAT JOYSTICK
Manufacturer: Cheetah
Price: £29.95

First came the Mouse, a small robot capable of finding its way around a maze, now we have the RAT, a Remote Action Transmitter. The RAT, however, is not mobile. It is a joystick with a difference for the Spectrum or Commodore 64.

The first thing you notice about the RAT is the absence of a stick to move for directional control. This has been replaced with a touch sensitive pad. This in itself is not a new concept, but the lack of leads on the RAT is. It works on infra red transmissions which are picked up by the interface plugged into the back of the Spectrum. This means that you can use the RAT almost anywhere in the room and are not restricted by the length of a lead.

The transmitter sends out quite a wide signal which means that you don't have to point the RAT directly at the receiver. Cheetah have made it operate with the Kempston protocol which is the best established and therefore has the largest range of software written to work with it.

My main criticism of the RAT is that it takes a fraction of a second to respond to any movement or firing which means that you have to move or fire slightly before you would have to normally. It is therefore not suited to fast reaction games.

The RAT could, however, be quite useful for remote software control, for serious applications as well as for games, but for now I'll stick to my Quickshot!

TTX2000 TELETEXT ADAPTOR
Manufacturer: O.E. Ltd (OEL)
Price: £143.75

The O.E.L. modem for the Spectrum has been a tremendous success. It

even discouraged Sinclair from producing a modem of their own. The TTX2000 is a similarly impressive product.

It is Spectrum-sized and sits underneath the machine connected by a ribbon cable. The system has a profusion of wires. In addition to the ribbon cable with its connector for other Spectrum peripherals there is a mains lead and power supply, a lead from the television aerial and the usual leads to and from the computer.

The user guide is clear but brief. There is a diagram showing what plugs into what. The TTX2000 ROM overlays the usual BASIC and operating system. This means that the system powers-up into teletext mode. It is possible to return to BASIC without having to unplug the adaptor.

Setting up is not difficult but it is rather fiddly. Tuning the channels to the correct station takes quite a time. There is quite extensive control over the teletext adaptor, the options are select page, save page to Microdrive, hold and release page, reveal and conceal page, select channel, copy page to printer and exit to BASIC. It is also possible to change the brightness. OEL assume that anyone who wants to load and save screens has a Microdrive.

The TTX2000 can access any of the pages on the broadcast teletext service. These are Ceefax for the BBC service and Oracle for ITV and Channel 4. The kind of information available includes schedules for TV programmes, news, film and theatre reviews, joke pages and various other magazine type items. There are specialist pages with information on sport, stock markets and for the hard of hearing.

These pages can be looked at, saved or printed out. Once the information is on the screen it can, in theory, be read. So a program to draw a graph of fluctuating currency rates is a possibility, providing the page format is kept the same.

It is possible to download programs from a teletext service, however neither the BBC nor ITV yet broadcast such programs. If the adaptor catches on then the authorities may decide to display Spectrum software. However if the choice of Beeb program which is up there now is anything to go by there is very little that you would want to use. Since teletext is a one way system there is no way of sending messages back to the main computer. Except,of course, snail mail.

Before buying this have a look at teletext and decide whether it is a service that you are likely to use. If it is then the TTX2000 is for you.

VTX5000 PRESTEL ADAPTOR
Manufacturer: O.E. Ltd for Prism
Price: £99.95

The VTX5000 is a device which fits neatly under the Spectrum and allows the user to connect up British Telecom's "Prestel" service and to its computing section, Micronet. The VTX5000 has its software in ROM and a built in modem.

When you turn on the Spectrum, the Micronet logo appears and on hitting a key you are presented with a menu. You may choose to log-on to Prestel, prepare a message to be sent on the mailbox service, (which saves doing this while actually being connected to the database, cutting down on phone and Prestel charges) or to go into BASIC.

Once you have logged on, by phoning one of the Prestel computers and typing in your ID number and password, you may return to this menu to send the prepared message, save a frame on tape or dump it to the ZX printer or download software. This last function gives the user the ability to load software over the 'phone line from the Prestel computer, Micronet has quite a large range of software to offer with some software houses offering their programs at cheaper prices than in the shops. The disadvantage of this is that you don't get the nice packaging and inlay card, but some companies offer to send the latter to buyers.

When you are actually connected, you can wander around Prestel's huge database and run up high 'phone bills with ease! Also supplied with the VTX5000 is some user to user software, allowing users to talk to each other over the 'phone via their Spectrums.

To sum up, this peripheral is ideal for someone who is getting bored with the confines of their Spectrum and wants to try something new. However, remember that Micronet costs £1 per week plus extra page and connection charges on top of the 'phone charges so use with care.

MICRO COMMAND SPEECH RECOGNITION UNIT
Manufacturer: Orion Data
Price: £49.95

Dr Dolittle sang about talking to the animals. well now Spectrum owners can talk to their computers. The Micro Command can translate speech into action. It's vocabulary is limited to sixteen words so the day of the talking typewriter has not yet arrived — unless you are a man of very few words.

Bundled with the hardware is a game called 'Sheep Talk' a version of the Virgin Games' program 'Sheep Walk'. The documentation consists of two skimpy manuals. These make up the user guide and the programmers' manual.

Commands are issued to the computer through a microphone which plugs into the black box which is in turn slotted into the Spectrum's edge connector, including the Spectrum Plus's.

The price is justified when you open up the case. Inside there is a Z80 processor with its own ROM and RAM. In effect it is another computer.

The Micro Command is very fussy about volume and tone of the speech which you use to control it. When you have taught it a word you must repeat it in exacly the same manner if you want it to perform the appropriate action. So if you shout the first few times you must shout every time. This peripheral is slightly unusual and would make a great Christmas present.

MICROSPEECH SPEECH SYNTHESISER
Manufacturer: Currah
Price: £29.95

The Currah Microspeech is a device which, when plugged into the back of the Spectrum, can produce speech. The real beauty of it is its ease of use. When you first turn on the Spectrum every key that you hit will be echoed through your TV set in speech. This is a novel idea and can make typing easier for the inexperienced as they are get-

To make the computer say something, you just ting positive feedback on their typing. However, it can get annoying and is easily turned off by LET KEYS = 0. To make the unit say what you want is also very easy as it uses allophones. This means that all the basic speech sounds are available for you to string together into words.
put it into s$, so to make the computer say hello, you just type: LET a$ = "he(ll)(oo)". The brackets are used to put emphasis on sounds and create others like "ou", "oo" and "ei". Upper and lower case can also be used to change the tone of the speech so that it sounds less monotonous. After a bit of practice, you can string together an intelligable sentence in a very short time.

The Microspeech is also well supported by many software houses, with games and adventures being available making use of speech. This can make a game a bit more fun and be useful for relaying status information to the player.

The speech unit however, has uses far beyond games as it can be used for eduational purposes very well. Even someone with a limited amount of programming knowledge can knock-up a simple speak and spell program for children.

This peripheral is well designed for easy use with the added fact that it can amplify the Spectrum beep through the TV, it is well priced at £29.95.

MICRO (μ) SLOT
Manufacturer: Currah
Price: £14.95

When Currah brought out its Microspeech unit, people purchased it not only to program themselves, but to add spice to their games. Companies such as Ultimate and Bug Byte, released games that made use of the speech unit. The only problem was that you could not use certain joystick interfaces, such as the Kempston one, at the same time, as neither had an edge connector to plug the other into.

But Currah realising this, released their Microslot. This unit is a mother board that plugs into the edge connector at the back of the Spectrum and has two edge connectors built in, to allow you to plug in two peripherals. I hear screams of delight from frustrated Lunar Jetman, The Birds and the Bees and Pogo players, but hold your horses. The designers of the Microslot, in an attempt to retain the good looks, made it too short to plug a joystick into the Kempston interface with the speech unit plugged in. If, however, you have a joystick interface with connections coming out of the side or top, you are fine.

The Microslot does however, have uses far beyond games. Any peripheral can be plugged in and I have found that there are some useful combinations. There are also some lethal combinations though, such as the Microspeech and Interface 2 and in the manual it says that some software programmable joysticks are not compatible with the Microspeech. The most useful mixture I have found is being able to have both the ZX printer and a Kempston Printer interface plugged in. Depending on whether the software for the Kempston is present or not, it decides which printer works. There are some combinations, such as ROM based interfaces, that may not be compatible, so care must be taken.

One asset of the Microslot is that more can be bought and stacked, so that you can have as many peripherals plugged in as you like as long as they like each other and the Spectrum power supply can cope. One way of getting round the joystick problem, is to use two stacked Microslots, which leaves the gap for the joystick, but this seems expensive at £14.95 each. The race is now on for the first five foot long Spectrum.

COMPANY DETAILS

Cheetah Marketing
24 Ray Street
London EC1R 3DJ
Tel: (01) 833 4909

Currah
Graythorpe Ind. Est.
Hartlepool
Cleveland TS25 2DF
Tel: (0429) 72996

O.E. Limited (OEL)
North Point
Gilwilly Industrial Estate
Penrith
Cumbria CA11 9BN
Tel: (0768) 66748

Orion Data
3 Cavendish Street
Brighton
E. Sussex BN2 1RN
Tel: (0273) 672994

Rotronics Limited
Santosh House
Marlborough Trading Estate
West Wycombe Road
High Wycombe
Bucks HP11 2LB
Tel: (0494) 452757

Sinclair Research
28 Stanhope Road
Camberley
Surrey
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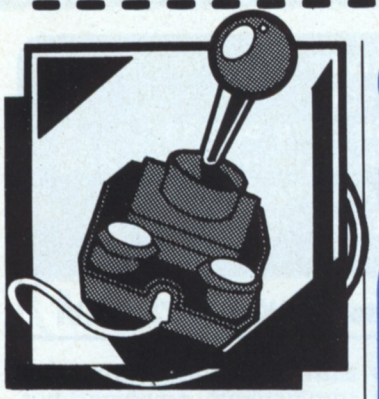


Software Reviews

REVIEWS

Title:	**The Pyramid**
Format:	**Tape**
Software House:	**Fantasy Software Ltd., Fauconberg Lodge, 27a St Georges Road, Cheltenham, Gloucester**
Price:	**£6.50**
Machine:	**CBM 64**

The Pyramid is an arcade game which also has an adventurous feel. The Pyramid itself consists of 120 chambers spread over 15 levels. You have to explore the Pyramid from top to bottom visiting as many chambers as possible. In order to get from one chamber to another on the next, lower and more dangerous, level you have to fight off the inevitable assortment of bizarre life forms to collect an energized crystal. Once you have this crystal in your possession, providing you hang on to it, you are able to weaken the force field guarding one of two exits and eventually escape.

Because you have the choice of two exits from each chamber, the route you take is likely to be different each time you play. Apart from the challenge of scoring as many points as possible there is also a number puzzle to solve. The more chambers you visit the more information you have to enable you to solve the hidden mystery of the Pyramid.

I found this game very addictive. It is well written and contains enough elements to stop it being just another 'shoot-em-up' game. On a technical note I was surprised to see the title page remain on screen whilst the program loaded. As all 64 owners know the screen always blanks out during loading. Fantasy Software have got round this, and this added to the overall presentation.

STAR TABLE	
Screen display	* * *
Addictiveness	* * * * *
Ease of use	* * * * *
Overall	80%

Title:	**Spectrealm**
Format:	**Tape**
Software House:	**Runesoft**
Price:	**£6.95**
Machine:	**Spectrum 48K**

Taking the role of the Governor of a small state, you are given the task of building up your poor and insignificant country into a world super power. Also you must try to stay in office for 100 years with elections arising every 5 years. The only way to improve your country's status is by judicious management of your sole home produced item, corn.

You begin life as the Governor by making certain election promises to your people in terms of wealth improvement and you are best advised to attain these figures if possible. After you have decided which is the best course of action for each year's produce you are shown the meteorological report for the season following and all I have to say is that you had better hope for good weather!!

At the end of five years your country votes on your governing competance and this is the deciding factor of the game. Good Luck!!

G.W.

STAR TABLE	
Screen display	* *
Addictiveness	* * * *
Ease of use	* * * *
Overall	60%

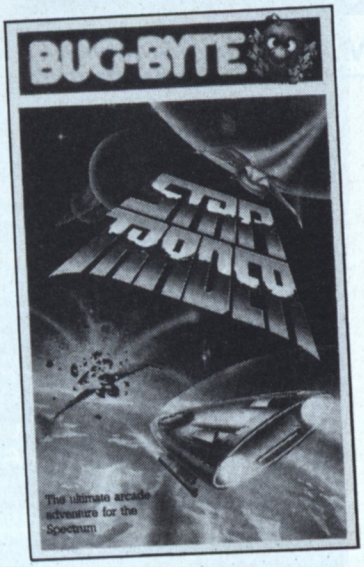
Title: Star Trader
Format: Tape
Software House: Bug Byte Ltd., Mulberry House, Canning Place, Liverpool.
Price: £6.95
Machine: Spectrum 48K

A subtle combination of arcade game and logic, Star Trader has a theme in which you take the role of a trader between eight planets.

You start the game with a space ship and an allotment of money. You then have to travel the galaxy from one planet to another, buying commodities such as guns, grain, or gold wherever you can obtain them cheaply and then sell them for inflated prices on other planets where they are in short supply. The object of the game is to make as much money as you can.

Obstacles on your way take various shapes, such as the Customs Officials who might charge you import duty, being mugged or being declared unfit to fly due to not eating sufficient. The main obstacle however is the band of Space Pirates who attack you whilst travelling from one planet to another. This is the point at which the arcade action comes in. Star Trader is also available for the CBM 64. **D.W.**

STAR TABLE	
Screen display	* * *
Addictiveness	* * * *
Ease of use	* * * * *
Overall	80%



Title: River Rescue
Format: Tape
Software House: Creative Sparks, Thompson House, 296 Farnborough Road, Guildford GU14 7NU
Price: £8.95
Machine: Atari 16K

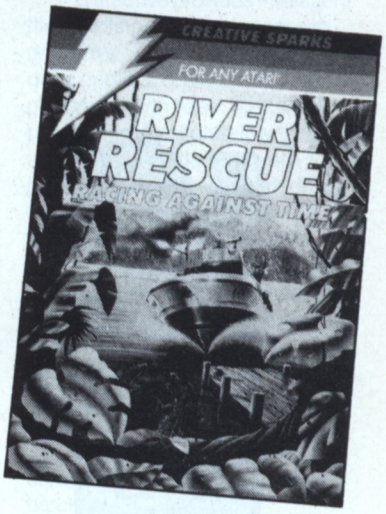
The object of the game is to steer a speedboat down a river, picking up scientists as you go. To rescue a scientist, you must dock at one of the jetties. Docking at the south bank causes all scientists to leave the boat.

Touching the river banks, rocks, crocodiles or logs results in death for you and any scientists aboard. You can destroy crocodiles with one blast from the cannon which is fitted to the front of the speedboat. Logs require three direct hits to be destroyed.

Occasionally a helicopter flies overhead, dropping a cluster of mines as it goes. To continue down river you must blast a path through the mines.

There are many superior games of this sort for the Atari computers. The game has limited variation and uninspired graphics, but at £8.95 River Rescue is less expensive than most of the competition.

STAR TABLE	
Screen display	* * *
Addictiveness	* * *
Ease of use	* * *
Overall	60%



Title: Blockbuster
Format: Cassette
Software House: Micropower, Northwood House, North Street, Leeds
Price: £7.95
Machine: BBC Model B

The rocks of the Giant's Causeway have been the inspiration of several games, with various creatures bouncing from pillar to pillar, pursued by various meanies, for various reasons! This version, from Micro power, maintains their reputation as the producers of some of the fastest, slickest and most addictive games for the Acorn machines.

Harvey is the hero of this saga, as he tries to bounce onto every rock therby changing the colour, until every one has been altered. Life in these games is never easy and poor young Harvey has several problems to contend with. The worst of these is Reynard the fox, who homes in on the rabbit with unnerving accuracy, although Harvey does have two magic discs which lure the fox to an untimely end. There are also balls which bounce down the rocks, and which would crush our hero given the chance. Lastly, an albatross has a most unsociable habit, which makes it inadvisable to stand below it!

However, all is not gloom and despair, for there are rewards to be gained when all the blocks are recoloured correctly. For a start there are points, and then there is another screen, and another, and so on to contend with. At later levels, it is necessary for Harvey to jump onto each rock twice, which is difficult enough as it is, even if it wasn't for the squirrel . . . .

A superb game, with the standards of graphics, speed and sound we have come to expect from Micro power. It is simple to play, yet frustratingly difficult to succeed at, which makes it one of the most addictive games I've loaded into my Beeb! **P.T.**

STAR TABLE	
Screen display	* * * * *
Addictiveness	* * * * *
Ease of use	* * * *
Overall	95%

Title: Tudoroll
Format: Tape
Software House: J. Morrison (Micros) Ltd, 2 Glensdale Street, Leeds, LS9 9JJ
Price: £7.95
Machine: Acorn Electron

What a shame that this software house could not check out their product fully before putting it forward commercially. Tudoroll is a game based on the idea of Yahtzee played with three cards and a trump card.

At the beginning of each game the number of players, their names and their skill levels are entered. Once these preliminaries are complete the first player's score card is displayed, together with a hand of three cards and a trump card. The scoring capability of the hand may be changed by altering some of the cards. When satisfied with a hand the score may be put into one of the boxes on the score-card. This continues until the boxes (nine in all) on the score-card have all been used.

The display throughout the game is excellent being clear at all times. A nice touch is included for those with black-and-white television sets where a notch on a card is used to indicate the colour being displayed. Thoughtful of them.

However, why oh why didn't they check the game fully? On the scoring side, the points given for scoring in the otherwise excellent accompanying instructions are different to those actually given in the game, a true score of zero in any one score-card box actually gives a score of one and there is no explanation of how the bonus is awarded. When I tried the game with four players, the names of the first two I entered were reversed!

If this company can sort out these irritating idiosyncracies they have a competent product on their hands.

G. de B.

STAR TABLE	
Screen display	* * * * *
Addictiveness	* * * *
Ease of use	* * * *
Overall	80%

Title: Kalah
Format: Tape
Software House: Talent Computer Systems, Scotland.
Price: £7.95
Machine: CBM 64

Kalah is the oldest game in the world. In hot desert countries it has wasted more time than any other pursuit. It is a game played on a board with two rows of shallow pits and one large pit each, called a Kalah. Each player is in control of the pits on his side of the board and owns the Kalah to his right.

At the start of the game each of the 12 pits, but not the Kalahs, are filled with the same number of stones from three to six. To make a move you choose a pit on your own side that contains a stone or stones, pick up all the stones and distribute them going anti-clockwise until they run out. You must not miss out any pits except your opponents Kalah. The object of the game is to collect more than half of the stones in your own Kalah.

This simple to learn game is fabulously laid out on your computer screen and makes a nice change to chess. With background music from Johann Sebastian Bach, I would recommend this game to any board game freak.

STAR TABLE	
Screen display	* * * *
Addictiveness	* * *
Ease of use	* * * * *
Overall	80%

Title: Revenge of the Killer Tomatoes
Format: Tape
Software House: Visions Software Ltd., Felgate Mews, Studland Street, London
Price: £5.95
Machine: Spectrum 48K

A clever variation on the typical Pac-Man maze theme. Only this time the maze moves as well! Full marks to Kevin Bezant for imagination; see if you can follow this.

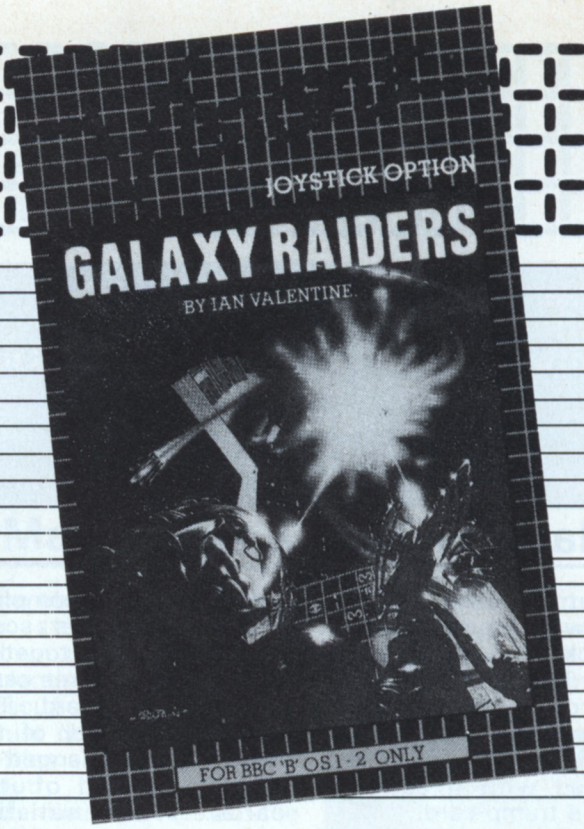
You are Smiffy, the Gardener and have to be manoeuvred around the garden pulling out weeds by passing over them. However, it is not as easy as that. You must avoid at all costs, the Killer Tomatoes, the Psycho Swedes, and the Manic Mushrooms, all of whom will lose you a life. Meanwhile the cabbages in the garden (they are the maze) move around.

Points are awarded by earning your wages for each life. £100 is awarded for each weed pulled out whilst £25 is deducted every time that you tread on a cabbage.

The game can be played with keyboard or Kempston joystick. If the keyboard is chosen, you can either use the default control keys or select your own.

D.W.

STAR TABLE	
Screen display	* * * *
Addictiveness	* * *
Ease of use	* * * *
Overall	75%



Title:	**Galaxy Raiders**
Format:	**Tape**
Software House:	**Visions Software Ltd. 1 Felgate Mews, Studland Street, London W6**
Price:	**£6.95**
Machine:	**BBC Model B**

The plot of Galaxy Raiders is simple. Using your limited resources you must destroy all of the Arian ships in the Galaxy. You must protect your starbases and complete your mission in the shortest possible time.

Sounds easy does it? Well on skill level 1 it's as easy as falling off a laser turret (after a bit of practice) but on level 4 (for hardened Vidkids only), with three different alien types and six starbases to defend and your engines constantly conking out, wading through thick treacle on roller skates would be easier.

The program itself is very well produced. A nice title screen introduces the game. Decide what skill level you want and you're off. The stars zoom past you in stunning 3-D graphics and the aliens hurtle towards you firing as they go. Missiles on — FIRE, no hit; phasers on — ZAP ZAP, the screen flashes white signifying one less alien to destroy.

Okay, so it's not exactly state-of-the-art Star Raiders quality but at £6.95 it represents excellent value for money and conventional 'Trek' games pall into insignificance beside it. The documentation is excellent as well, a 10 page booklet is included and, apart from a few omissions it will help you a lot.

At the end of each mission, the Galactic Commanders (who else?) give you a score and a grading ranging from Rookie to Star Commander. Overall, an absolutely first class game. Play it if you dare!!! **A.B.**

STAR TABLE	
Screen display	* * * * *
Addictiveness	* * * *
Ease of use	* * * * *
Overall	95%

Title:	**Hi Bouncer!**
Format:	**Tape**
Software House:	**Mirrorsoft, Holborn Circus, London EC1P 1DQ**
Price:	**£8.95**
Age Range:	**3+**
Machine:	**BBC Model B**

First Steps with the Mr. Men has been a firm favourite with my children for some time now, so I am delighted to be able to report this new Mirrorsoft tape features those delightful characters once more. Not only that, but this is a vast improvement on the earlier tape in a number of ways.

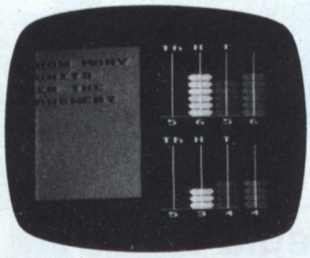
After loading, which was straighforward, a rather good 3-D effect of a street corner is shown, with the Mr. Men moving about. A catchy and well-programmed tune is played continuously until someone decides to play. There are two versions on the tape, one at real speed and the other at practice speed, with the two sides having both programs recorded but in alternate order so that it is generally going to be easier to load one side than the other. both games are identical in all respects apart from the speed and I found that even my three-year-old could attempt the practice speed.

On the first screen, Mr. Bounce has to pick up the scarf of Mr. Tall. He either rolls in a delightful fashion, or he bounces by using a direction key simultaneously. A more gentle bounce can also be obtained by a different combination. Mr. Bounce is not allowed to touch any of the Mr. Men who wander around, so he has to bounce over them and try at the same time to land the right way up on the scarf. When he is successful, the tune plays once more, and we move into the next screen and so on.

All the scenes have beautifully smooth animation and the colours and figures certainly appealed to my children. After screen four, we move back to the first, but with extra difficulties and more to do. In all there are 32 screens! I found the game a welcome contrast, and I thoroughly enjoyed it as a game in its own right. **P.T.**

4 NEW PROGRAMS on your children's screen this Christmas!

Maths Pack



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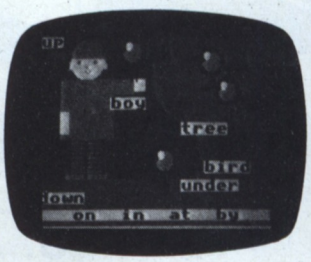
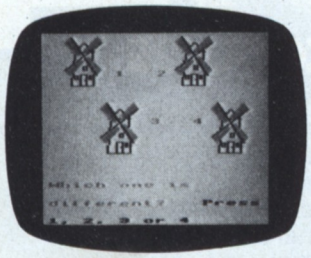
Pick-a-Word

- Five first school level reading programs
- Introduction to word selection in association with graphics
- Specially designed to be "user friendly"
- Enchanting rewards of Nursery tunes and fun pictures



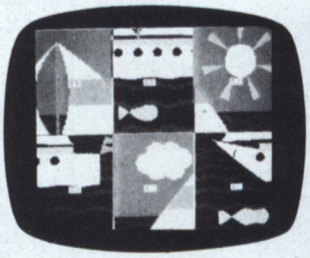
Learning Compendium 1



- Seven entirely different programs
- Introducing maths, spelling and shape recognition
- Different levels of difficulty and excellent graphics
- Tests perception - comparative adjectives and relevant size

Jigsaw Puzzle

- A fascinating memory and reaction training program
- Four colourful attractive pictures
- Graded to five levels of difficulty
- Results are compared so the game is competitive at all levels



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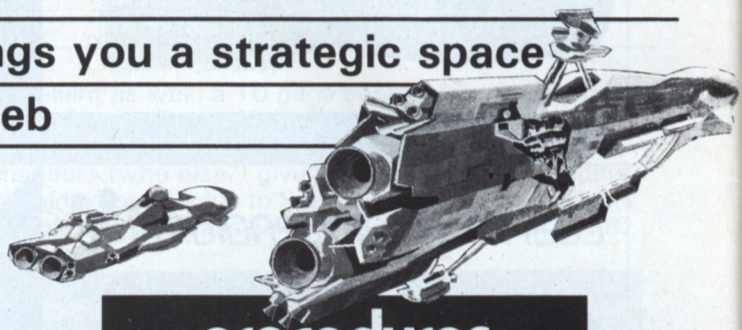
Hyper combat

S. Abraham brings you a strategic space game for the Beeb



The game is set in hyperspace. The Xenons, for so long a threat to the safety of the Earth, have finally launched their attack. Armed with only five battlecruisers and your intelligence, your mission is to stop them.

After all five of their aliens have been killed, a congratulatory tune is played and you have the option of playing again.

Planets, emanating lethal radiation, are scattered around hyperspace. If you travel within its sphere you will automatically die. To kill the enemy, you must shoot him when he is at his gun. Laser beams which hit him when he is in any other location will have no effect. Full instructions and controls are contained within the program.

procedures

PROCfillin	Procedure which calls up 4 instruction procedures
PROCerror	Checks and prints any error
PROCsetup	Sets up screen and draws scenery
PROCscorer	Updates red score
PROCscoreb	Updates blue score
PROCaction	Main procedure for movement of characters
PROCredfire	Fires red gun
PROCbluefire	Fires blue gun
PROCchecksb	Checks if blue has been hit
PROCchecksr	Checks if red has been hit
PRCfanfare	Plays tune and asks if you want revenge
PROChyper	Prints title page
PROCearth	Prints Earth Briefing Plan
PROCxenon	Prints Xenon Galactic Strategy
PROCcontrols	Prints controls for both players

variables used

NR% No. of Earth lives left
NB% No. of Xenon lives left
X%,Y% Earth Man's coordinates
A%,B% Xenon Man's coordinates
C% Background colour
A%,R%,U%,A Variables for the planets
STAR% No. of stars to be printed
L%,X Local procedure variables
P% No. of remaining men to be printed
WAIT% Delay variable
M% No. of notes to play
N%,N1% Pitch of the 2 notes
D%,D1% Duration of the 2 notes
REVstring Answer to question
O string Earth Man
Z string Xenon Man
A string Input to continue

BBC

how it runs

Line	Effect
10-70	Print title.
80	Recognises any typing errors.
90-130	Define characters.
140-150	Turn separate characters into strings.
160	Turns off cursor.
170-240	Sequence events in game.
250-310	Set variables.
320-330	Print two opposing enemies on screen.
340-490	Main loop of program which sees which keys are being pressed.
500-540	Move Earth Man.
550-580	Move Xenon Man.
590-670	Procedure for firing Earth Man's laser.
680-710	Procedure which defines sound for EARTH'S gun.
720-800	Procedure which defines XENON'S GUN.
810-850	Procedure which defines sound for Xenon's gun.
860-900	Check if Xenon man has been hit.
910-950	Check if Earth man has been hit.
960	Start of procedure which initialises screen.
970-1040	Draw the sun in foreground.
1050-1250	Draw White Planet.
1260	Sets origin back to (0,0).
1270-1320	Draw stars on screen at random.
1330-1440	Lines of procedure which kills Earth man.
1450-1530	Jump to score procedure.
1550-1630	Lines of procedure which kills Xenon man.
1640-1720	Jumps to score procedure.
1730-1840	Resets Earth man's score.
1850-1960	Resets Xenon man's score.
1970-2000	Sequence of istructions.
2010-2190	Print title page.
2200-2370	Print EARTH BRIEFING PLAN.
2380-2510	Print XENON GALACTIC STRATEGY.
2520-2670	Print controls.
2680-2740	Sound warning siren.
2750-2800	States who is destroyed.
2810-2850	Loop for music.
2860-2910	Data for music.
2920-2980	Ask if you want to get revenge.
2990-3030	Error detection procedure.

Hypercombat

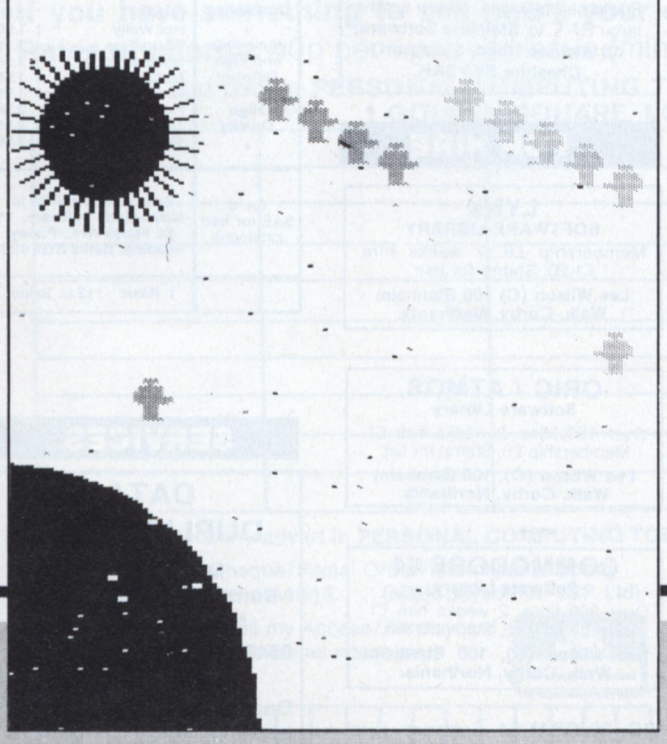
program listing

```
  10 REM ******************
  20 REM ** HYPER COMBAT **
  30 REM ******************
  40 REM ** by S.Abraham **
  50 REM ******************
  60 REM ** 2 April 1984 **
  70 REM ******************
  80 ON ERROR PROCerror
  90 VDU23,224,56,56,16,124,124,252,252,255
 100 VDU23,225,255,126,56,56,56,56,56,60
 110 VDU23,226,28,28,8,62,62,63,63,255
 120 VDU23,227,255,62,28,28,28,28,28,60
 130 VDU23,228,0,0,0,24,24,0,0,0
 140 O$=CHR$224+CHR$8+CHR$10+CHR$225
 150 Z$=CHR$226+CHR$10+CHR$8+CHR$227
 160 MODE7:VDU23;8202;0;0;0;:*FX11,0
 170 PROCfillin
 180 MODE2
 190 GCOL0,128:CLG
 200 PROCsetup
 210 NR%=5:NB%=5
 220 PROCscoreR
 230 PROCscoreB
 240 PROCaction
 250 DEFPROCaction
 260 VDU5
 270 X%=200
 280 Y%=600
 290 A%=1000
 300 B%=600
 310 C%=0
 320 MOVEX%,Y%:GCOL0,1:PRINTO$
 330 MOVEA%,B%:GCOL0,4:PRINTZ$
 340 REPEAT
 350 IF INKEY(-66) THEN GOSUB500
 360 IF INKEY(-98) THEN GOSUB510
 370 IF INKEY(-67) THEN GOSUB520
 380 IF INKEY(-83) THEN GOSUB530
 390 IF INKEY(-1) THEN PROCredfire
 400 IF INKEY(-73) THEN GOSUB550
 410 IF INKEY(-105) THEN GOSUB560
 420 IF INKEY(-103) THEN GOSUB570
 430 IF INKEY(-104) THEN GOSUB580
 440 IF INKEY(-74) THEN PROCbluefire
 450 IF Y%<400 THEN PROCsplatR
 460 IF B%<400 THEN PROCsplatB
 470 IF Y%>800 THEN PROCsplatR
 480 IF B%>800 THEN PROCsplatB
 490 UNTIL FALSE
 500 MOVEX%,Y%:GCOL0,C%:PRINTO$:Y%=Y%+10:MOVEX%,Y%:GCOL0,1:PRINT
O$:RETURN
 510 MOVEX%,Y%:GCOL0,C%:PRINTO$:Y%=Y%-10:MOVEX%,Y%:GCOL0,1:PRINT
O$:RETURN
 520 MOVEX%,Y%:GCOL0,C%:PRINTO$:X%=X%-10:MOVEX%,Y%:GCOL0,1:PRINT
O$:RETURN
 530 MOVEX%,Y%:GCOL0,C%:PRINTO$:X%=X%+10:MOVEX%,Y%:GCOL0,1:PRINT
O$:RETURN
 540 REM ============================
 550 MOVEA%,B%:GCOL0,C%:PRINTZ$:B%=B%+10:MOVEA%,B%:GCOL0,4:PRINT
Z$:RETURN
 560 MOVEA%,B%:GCOL0,C%:PRINTZ$:B%=B%-10:MOVEA%,B%:GCOL0,4:PRINT
Z$:RETURN
 570 MOVEA%,B%:GCOL0,C%:PRINTZ$:A%=A%-10:MOVEA%,B%:GCOL0,4:PRINT
Z$:RETURN
 580 MOVEA%,B%:GCOL0,C%:PRINTZ$:A%=A%+10:MOVEA%,B%:GCOL0,4:PRINT
Z$:RETURN
 590 DEFPROCredfire
 600 MOVEX%+64,Y%-32
 610 GCOL0,7:PLOT29,X%+714,Y%-32
 620 PROCredgun
 630 MOVEX%+64,Y%-32
 640 GCOL0,C%:PLOT29,X%+714,Y%-32
 650 PROCcheckSB
 660 GCOL0,1:FORT=1TO100:NEXT
 670 ENDPROC
 680 DEFPROCredgun
 690 ENVELOPE 1,1,0,0,0,0,0,0,126,-1,0,-3,126,126
 700 SOUND 0,1,6,1
 710 ENDPROC
 720 DEFPROCbluefire
 730 MOVEA%-5,B%-32
 740 GCOL0,10:DRAWA%-640,B%-32
 750 PROCbluegun
 760 MOVEA%-5,B%-32
 770 GCOL0,C%:DRAWA%-655,B%-32
 780 PROCcheckSR
 790 GCOL0,4:FORT=1TO100:NEXT
 800 ENDPROC
 810 DEFPROCbluegun
 820 SOUND1,-15,153,1
 830 SOUND1,-15,145,1
 840 SOUND1,-15,137,1
 850 ENDPROC
 860 DEFPROCcheckSB
 870 IF POINT(A%-2,B%-32)=C% AND Y%=B% AND A%-X%<720 THEN PROCsp
latB ELSE ENDPROC
 880 NB%=NB%-1:PROCscoreB
 890 MOVEX%,Y%:GCOL0,1:PRINTO$
 900 ENDPROC
 910 DEFPROCcheckSR
 920 IF POINT(X%+64,Y%-32)=C% AND B%=Y% AND A%-X%<720 THEN PROCs
platR ELSE ENDPROC
 930 NR%=NR%-1:PROCscoreR
 940 MOVEA%,B%:GCOL0,4:PRINTZ$
 950 ENDPROC
 960 DEFPROCsetup
 970 LOCAL A%:R%=400
 980 GCOL0,3
 990 MOVER%,0
1000 FOR A%=0 TO 90 STEP5
1010 A=RAD(A%)
1020 MOVE0,0
1030 PLOT85,R%*COS(A),R%*SIN(A)
1040 NEXT
1050 GCOL0,0
1060 FOR U%=1 TO 15
1070 PLOT69,RND(300),RND(300)
1080 NEXT
1090 R%=100
1100 GCOL0,7
1110 VDU29,150;900;
1120 MOVER%,0
1130 FOR A%=0 TO 360 STEP10
1140 A=RAD(A%)
1150 MOVE0,0
1160 PLOT85,R%*COS(A),R%*SIN(A)
1170 NEXT
1180 R%=150
1190 GCOL0,15
1200 MOVER%,0
1210 FOR A%=0 TO 360 STEP10
1220 A=RAD(A%)
1230 MOVE0,0
1240 DRAWR%*COS(A),R%*SIN(A)
1250 NEXT
1260 VDU29,0;0;
1270 GCOL0,0:FORU%=1 TO 10:PLOT69,RND(200)+50,RND(200)+850:NEXT

1280 FOR STAR%=1 TO 100
1290 PLOT69,RND(1200),RND(1024)
1300 GCOL0,RND(7)
1310 NEXT
1320 ENDPROC
1330 DEFPROCsplatR
1340 VDU19,8,8,0,0,0
1350 MOVEX%,Y%:GCOL0,8:PRINTO$
1360 ENVELOPE1,1,127,0,0,30,0,0,126,-1,0,-1,126,90
1370 SOUND1,2,100,40
1380 SOUND2,2,100,40
1390 SOUND3,2,100,40
1400 FOR X=1 TO 20
1410 MOVERND(400)+X%-200,RND(400)+Y%-200
1420 GCOL0,8
1430 VDU228
1440 NEXT
1450 TIME=0:REPEAT UNTIL TIME>500
1460 VDU19,8,0,0,0,0
1470 IF Y%<400 THEN NR%=NR%-1:PROCscoreR
1480 IF Y%>800 THEN NR%=NR%-1:PROCscoreR
1490 GCOL0,0:MOVEX%,Y%:PRINTO$
1500 GCOL0,0:MOVEA%,B%:PRINTZ$
1510 GCOL0,1:X%=200:Y%=600:MOVEX%,Y%:PRINTO$
1520 GCOL0,4:A%=1000:B%=600:MOVEA%,B%:PRINTZ$
1530 ENDPROC
1540 DEFPROCsplatB
1550 VDU19,13,13,0,0,0
1560 MOVEA%,B%:GCOL0,13:PRINTZ$
1570 ENVELOPE1,1,-26,-36,-45,255,255,255,127,0,0,-127,126,0
1580 SOUND0,1,53,100
1590 FOR X=1 TO 20
1600 MOVERND(400)+A%-200,RND(400)+B%-200
1610 GCOL0,13
1620 VDU228
1630 NEXT
1640 TIME=0:REPEAT UNTIL TIME>500
1650 VDU19,13,0,0,0,0
1660 IF B%<400 THEN NB%=NB%-1:PROCscoreB
1670 IF B%>800 THEN NB%=NB%-1:PROCscoreB
1680 GCOL0,0:MOVEX%,Y%:PRINTO$
1690 GCOL0,0:MOVEA%,B%:PRINTZ$
1700 GCOL0,4:A%=1000:B%=600:MOVEA%,B%:PRINTZ$
1710 GCOL0,1:X%=200:Y%=600:MOVEX%,Y%:PRINTO$
1720 ENDPROC
1730 DEFPROCscoreR
```

program listing

```
 1740 VDU5
 1750 IF NR%<1 THEN MOVE400,980:GCOL0,0:PRINTO$:MOVEX%,Y%:GCOL0,0
:PRINTO$:NR%=0:PROCfanfare
 1760 MOVE400,980:GCOL0,0
 1770 FOR P%=1 TO NR%+1
 1780 PRINTO$:
 1790 NEXT
 1800 MOVE400,980:GCOL0,1
 1810 FOR P%=1 TO NR%
 1820 PRINTO$:
 1830 NEXT
 1840 ENDPROC
 1850 DEFPROCscoreB
 1860 VDU5
 1870 IF NB%<1 THEN MOVE700,980:GCOL0,0:PRINTZ$:MOVEA%,B%:GCOL0,0
:PRINTZ$:NB%=0:PROCfanfare
 1880 MOVE700,980:GCOL0,0
 1890 FOR P%=1 TO NB%+1
 1900 PRINTZ$:
 1910 NEXT
 1920 MOVE700,980:GCOL0,4
 1930 FOR P%=1 TO NB%
 1940 PRINTZ$:
 1950 NEXT
 1960 ENDPROC
 1970 DEFPROCfillin
 1980 CLS:PROChyper:PROCearth
 1990 PROCxenon:PROCcontrols
 2000 ENDPROC
 2010 DEFPROChyper
 2020 PRINT:LOCAL L%
 2030 FOR L%=1 TO 2
 2040 PRINTCHR$141;CHR$129;CHR$157;CHR$131"     H Y P E R   C O M
B A T     ";CHR$156
 2050 NEXT
 2060 PRINT'CHR$(134)"  The Universe has remained relatively "
 2070 PRINTCHR$(134)"calm since the crush of the Mamajuans  "
 2080 PRINTCHR$(134)"in the 1st Era...until now . The Xenons"
 2090 PRINTCHR$(134)"have launched a massive task force its "
 2100 PRINTCHR$(134)"mission to wipe out the Earth people!! "
 2110 PRINTCHR$(134)"  It has long been foreseen that the 2 "
 2120 PRINTCHR$(134)"major superpowers would meet in combat."
 2130 PRINTCHR$(134)"Take sides now ! Join one of them or be"
 2140 PRINTCHR$(134)"crushed in the midst of it all !!"
 2150 PRINT'" Player 1.......EARTH"
 2160 PRINT" Player 2.......XENON"
 2170 PRINTTAB(25,22);CHR$131;CHR$136"Any key..."
 2180 A$=GET$
 2190  ENDPROC
 2200 DEFPROCearth
 2210 CLS:PRINT:LOCAL L%
 2220 FOR L%=1 TO 2
 2230 PRINTCHR$141;CHR$135;CHR$157;CHR$129"     EARTH BRIEFING PLA
N       ";CHR$156
 2240 NEXT
```



```
 2250 PRINT'CHR$(134)"   For all these centons Earth has kept"
 2260 PRINTCHR$(134)"conquering Galactic Invaders away using"
 2270 PRINTCHR$(134)"all their natural intelligence and     "
 2280 PRINTCHR$(134)"resource. We have to defend our colony!"
 2290 PRINTCHR$(134)"The Xenons are the most deadly aliens  "
 2300 PRINTCHR$(134)"we have encountered so far so be wary ."
 2310 PRINTCHR$(134)"    Like us, they have force fields so "
 2320 PRINTCHR$(134)"it is necessary to shoot them at their "
 2330 PRINTCHR$(134)"lasers otherwise they will not die . So"
 2340 PRINTCHR$(134)"now go out and smash them back to hell!"
 2350 PRINTTAB(26,23);CHR$131;CHR$136"Any key..."
 2360 A$=GET$
 2370 ENDPROC
 2380 DEFPROCxenon
 2390 CLS:PRINT:LOCAL L%
 2400 FOR L%=1 TO 2
 2410 PRINTCHR$141;CHR$135;CHR$157;CHR$132"  XENON  GALACTIC  STR
ATEGY    ";CHR$156
 2420 NEXT
 2430 PRINT'CHR$(134)"   The Earth people are a threat to our"
 2440 PRINTCHR$(134)"survival . They must be totally        "
 2450 PRINTCHR$(134)"obliterated . Accomplish this and we   "
 2460 PRINTCHR$(134)"will rule the Universe for ever . Noone"
 2470 PRINTCHR$(134)"can stop us . But beware of its Sun and"
 2480 PRINTCHR$(134)"the forcefield around the planet . GO !"
 2490 PRINTTAB(26,23);CHR$131;CHR$136"Any key..."
 2500 A$=GET$
 2510 ENDPROC
 2520 DEFPROCcontrols
 2530 CLS:PRINT:LOCAL L%
 2540 FOR L%=1 TO 2
 2550 PRINTCHR$141;CHR$129;CHR$157;CHR$131"     C O N T R O L S
    ";CHR$156
 2560 NEXT
 2570 PRINT'CHR$(134)"    Before you go REMEMBER . Don't     "
 2580 PRINTCHR$(134)"venture too near the Sun or the planet "
 2590 PRINTCHR$(134)"and don't go too far up or down ."
 2600 PRINT'SPC(9);"P1 (EARTH)";SPC(8)"P2 (XENON)"
 2610 PRINT'" Up";SPC(7);"A";SPC(17)"*"
 2620 PRINT" Down";SPC(5);"Z";SPC(17)"?"
 2630 PRINT" Left";SPC(5);"X";SPC(17)"<"
 2640 PRINT" Right";SPC(4);"C";SPC(17)">"
 2650 PRINT" Fire";SPC(5);"SHIFT";SPC(13)"RETURN"
 2660 PRINTTAB(26,23);CHR$131;CHR$136"Any key..."
 2670 A$=GET$
 2680 ENVELOPE2,1,5,0,0,15,0,0,126,0,0,-126,126,0
 2690 FOR S%=1 TO 4
 2700 SOUND 1,2,13,10
 2710 SOUND 2,2,25,10
 2720 SOUND 3,2,41,10
 2730 NEXT
 2740 ENDPROC
 2750 DEFPROCfanfare
 2760 *FX11,0
 2770 FOR WAIT%=1 TO 500:NEXT
 2780 VDU4,23;8202;0;0;0:CLS:COLOUR7
 2790 IF NR%=0 THEN PRINTTAB(3,5)"EARTH  DESTROYED"
 2800 IF NB%=0 THEN PRINTTAB(3,5)"XENONS DEFEATED"
 2810 FOR M%=1 TO 66
 2820 READ N%,D%,N1%,D1%
 2830 SOUND1,-12,N%-48,D%*2
 2840 SOUND2,-10,N1%,D1%*2
 2850 NEXT:GOTO2920
 2860 DATA 173,5,61,5,173,5,109,5,173,5,105,5,173,5,57,5,173,5,49
,5,173,5,97,5,173,5,89,5,173,5,41,5
 2870 DATA 173,5,33,5,193,2,5,81,2,5,177,2,5,81,2,5,165,2,5,85,2,
5,157,2,5,85,2,5,153,2,5,37,2,5,157,2,5,37,2,5,153,5,41,5,153,5,8
9,5,145,2,5,81,2,5,137,2,5,81,2,5,137,5,33,5
 2880 DATA 185,5,29,5,185,5,77,5,185,5,69,5,185,5,21,5,185,2,5,17
,2,5,173,2,5,17,2,5,149,2,5,65,2,5,97,2,5,65,2,5,165,2,5,49,2,5,1
61,2,5,49,2,5,185,2,5,97,2,5,177,2,5,97,2,5
 2890 DATA 177,5,21,5,177,5,69,5,177,5,61,5,177,5,13,5,177,2,5,9,
2,5,165,2,5,9,2,5,145,2,5,57,2,5,137,2,5,57,2,5,157,2,5,41,2,5,15
3,2,5,41,2,5,177,2,5,89,2,5,173,2,5,89,2,5
 2900 DATA 173,5,61,5,173,5,109,5,173,5,105,5,181,2,5,57,2,5,185,
2,5,57,2,5,157,5,49,5,157,1,25,97,1,25,165,1,25,97,1,25,173,2,5,9
7,2,5,173,2,5,85,2,5,165,2,5,85,2,5,165,2,5,69,2,5,157,2,5,69,2,5
 2910 DATA 153,2,5,89,2,5,145,2,5,89,2,5,145,1,25,61,1,25,153,1,2
5,61,1,25,157,2,5,61,2,5,157,5,69,5,153,2,5,21,2,5,145,2,5,21,2,5
,137,10,41,10
 2920 CLS:PRINTTAB(1,7)"GET REVENGE ?(Y/N)";
 2930 INPUT REV$
 2940 *FX12,0
 2950 IF LEFT$(REV$,1)="Y" THEN RUN
 2960 IF LEFT$(REV$,1)="N" THEN END
 2970 GOTO2920
 2980 ENDPROC
 2990 DEFPROCerror
 3000 REMOVE IF ERR=17 THEN ENDPROC
 3010 CLS:REPORT:PRINT" at line ";ERL
 3020 END
 3030 ENDPROC
```

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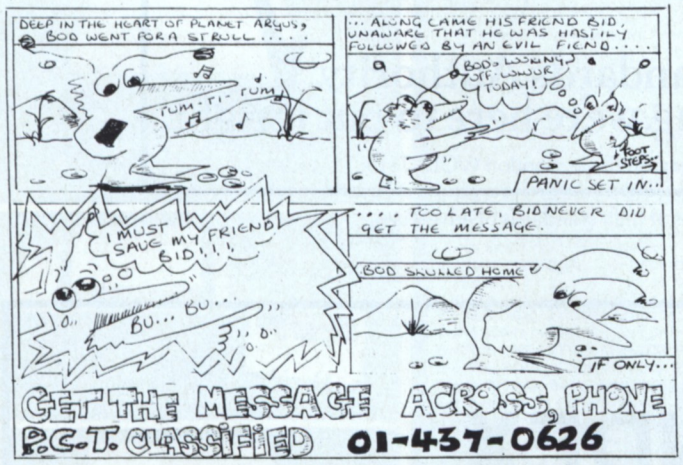

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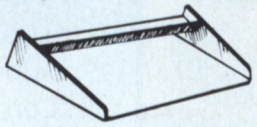

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